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Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[OFFICIAL NOTICE.]

To Exhibitors in Western Gas Association Display, Palace of Liberal Arts, World's Fair, St. Louis.

ST. LOUIS, MO., Nov. 21, 1904.

To those Interested: The railroads made a rate of one price for round trip on all freight consigned to the Louisiana Purchase Exposition. The original bill of lading must be in the hands of shippers at this end in order to insure return of goods FREE. There is a charge of 6 cents per 100 pounds to General Service Company for loading in cases, and 10 cents per 100 pounds for terminal charges, or a total charge of 16 cents per 100 pounds. Anyone holding original bills of lading, showing amount of freight paid and the routine thereof, should put them in my hands without delay.—FRED. R. PERSONS.

[OFFICIAL NOTICE.]

Wrinkle Department, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF SECRETARY,
DELAWARE, O., Nov. 21, 1904.

The Editor of the Wrinkle Department, Mr. E. E. Eysenbach, General Manager of the Binghamton (N. Y.) Gas Company, earnestly solicits the co-operation of the fraternity for contributions to be presented to the Twenty-first Annual Meeting of the Association, which is to be held at the Hotel Schenley, Pittsburg, Pa., March 15th, 16th and 17th, 1905.

Editor Eysenbach will be pleased to receive contributions not later than February 10th. Work for the good of the cause and send him your "Wrinkles."

T. C. JONES, Secretary.

BRIEFLY TOLD.

"BROKEN HISTORY" FROM THE WORLD'S FAIR.—St. Louis, Nov. 21, 1904.—Dear JOURNAL: "There seems small if any chance for an official announcement of awards at present owing to the unsettled difficulties between the Exposition officials and the National Commissioners. I am going to give the list of awards as we understand them here and given out by the Group Juries and passed by Superior Jury, with little likelihood of any amending. The awards cover exhibits in two buildings where the gas industry is represented, as follows:

"*Manufacturers' Building.*—Laclede Firebrick Mfg. Co., 2 grand prizes and gold medals; Western Gas Construction Company, Fort Wayne, Ind., 2 grand prizes, 5 gold medals and 2 silver medals; H. Mueller Mfg. Co., Decatur, Ills., 2 grand prizes and gold medals; Rund Mfg. Co., St. Louis, Mo., gold medal for automatic gas water heater; General Gas Light Co., Kalamazoo, Mich.; gold medal on gas arcs for inside and outside lighting; The P. H. & F. M. Roots Co., Connersville, Ind., gold medal for exhausters.

LIBRARY OF CONGRESS NOV 28 1904 SMITHSONIAN DEPOSIT

"*Palace of Liberal Arts.*—Western Gas Association, grand prize; American Meter Company, grand prize; Mueller Mfg. Company, Decatur, Ills, grand prize, for gas tapping machines, lead meter connections and gas cocks; Welsbach Street Lighting Company of America, gold medal for street lighting display; John Cabot, gold medal for trays for gas works; also, gold medals to the following: Connelly Iron Sponge and Governor Company, for iron sponge and governors; Hohman & Maurer, thermometers and gauges; Parker-Russell Mining and Mfg. Company, retort benches, etc.; New Orleans Lighting Company, antique engine; George Light, tapping machine; Welsbach Company, mantles and burners; Stamford Gas Stove Company, heating stoves; Eclipse Gas Stove Company, cooking ranges. Silver medals were granted to: S. R. Dresser, high pressure couplings; United Gas Improvement Company, water gas machinery models; Johnson & Reynolds, regulators; Safety Gas Stopper Company, Goodman main stoppers; Duff Mfg. Company, forcing jack; Wm. Cox, gas flow computer; Metric Metal Works, iron, high pressure meter; Maryland Meter Company, complaint meter; Bartlett, Hayward & Co., De Brouwer charger. Bronze medals went to: George Critchfield, oxide; Denver Gas and Electric Company, indexed catalogue; D. McDonald & Co., chemical apparatus; United Gas Improvement Company, chemical apparatus; Central Foundry Company, universal pipe and fittings; Storr's Mica Company, mica goods; Lindsay Light Company, mantles and burners; The Bristol Company, gauges.

"The following gas men registered at the Western's booth during the past week: B. F. Neff and Arthur Neff, Byron, O.; Asoba Naito, Tokio, Japan; A. H. Vail, Huntington, N. Y.; C. H. Raynor, Daytona, Fla.; George D. Roper, Rockford, Ills.; J. C. D. Clark, St. Louis; H. E. Knapp, Menominee, Wis.; W. D. Marshall, New Orleans, La.; M. J. Green, Rockford, Ills.; J. Alex. Mayers, New York; A. M. Smith, Cleveland, O.; John Williamson, Chicago; W. H. Odiorne, Springfield, O.; H. S. Capron, Princeton, Ills.; J. T. Pullen, Ottawa, Ills.; W. H. Romer, St. Henry, O.; John Cabot, New York city; W. B. Tuttle, Long Branch, N. J.; W. B. Smith, St. Louis, Mo.; P. L. Habbs, Cleveland, O.; R. W. Gordon, Syracuse, N. Y.; James H. Walker, Milwaukee, Wis.; D. B. Dyer, Augusta, Ga.; L. L. Hendley, Taylorville, Ills.; M. J. Kelaher, Louisville, Ky.; Jno. R. Winder, Jr., Salt Lake City; William M. Tauber, Budapest, Hungary; L. M. Whitwell, Syracuse, N. Y.; E. Austin Barnes, Syracuse, N. Y.; Jos. B. Gross, Huntington, Md.; Jas. W. Dunbar, New Albany, Ind.—FRED. R. PERSONS."

MR. CHARLES E. BOTLEY OFFERS A CORRECTION.—Charles E. Botley, M.Inst.C.E., and Engineer and Manager to the Hastings and St. Leonards Gas Company, Hastings, England, writing to the JOURNAL under date of the 3d inst., says: "In the *Journal of Gas Lighting* for 1st November is being published a reprint of the paper, by Messrs. Alfred H. White and S. Ball, being a reprint of their paper (read at the last annual meeting of the Michigan Gas Association) in which I am much interested. As I do not know the addresses of these gentlemen, I should like to point out with your permission, that I notice, in the appendix to the paper, the description of the method which we use here for securing us immunity from naphthaline troubles is described as follows: 'Oil is sprayed into purified gas by means of a spray pump.' This is not an accurate description of the method employed here. In fact, we should consider such a system very ineffective, in that it would not produce what we consider necessary—viz., an oil fog."

NOTES—

A CEREMONY that will have interest for the fraternity is reported from Baltimore, Md., where, the evening of the 15th inst., at St. Mary's Protestant Episcopal Church, the rector of the parish, Rev. F. Ward Denys officiating, Miss Araminta Fendall Dickey, daughter of Mr. and Mrs. Charles H. Dickey, was united in marriage to Mr. Harold C. Carpenter, of New York. The wedding reception was held in the home of the bride's parents, and it was worthy of the pair in whose homage it was arranged. The groom is a brother of Mr. Henry A. Carpenter, of the Riter-Conley Company.

THOSE who read the evening newspapers of the 17th inst. must have believed for five minutes or so that the entire plant of the Peoples Gas Light and Coke Company, of Chicago, had been destroyed by an explosion. There was an explosion the date mentioned, but it was in the storage plant of the Pyle National Electric Headlight Company, the yards of which are located at 74th street and Chicago avenue. Acetylene tanks were at the basis of the disaster, from which much loss of life and property resulted.

[ABSTRACT.—CONTINUED FROM PAGE 806.]

PROCEEDINGS, THIRTY-SECOND ANNUAL MEETING, AMERICAN GAS LIGHT ASSOCIATION.

HELD IN THE NEW WILLARD HOTEL, WASHINGTON, D. C., OCTOBER 19 TO 21, 1904.

FIRST DAY—OCTOBER 19—SECOND SESSION.

The President called for the

REPORT FROM COMMITTEE ON PRESIDENT'S ADDRESS,

which Mr. A. G. Glasgow read as follows:

Mr. President: I beg to announce that your Committee on President's Address is prepared to report. We have considered the subject and think it is utterly futile for us to attempt to bring any particular feature of the address to the attention of the members, for the reason that the address is an essay of such uniform and high excellence, from beginning to end, that every word of it must have gone home to each and every member of the Association. Furthermore, it is our opinion that this address marks a very happy epoch in Presidential addresses—that it is a breaking away from a routine which was tending to become monotonous, alike to authors and auditors, and that it is worthy, not only of earnest consideration by all people identified with the gas industry, but by everyone identified with the management of industrial properties of any sort, either aggregated or isolated.

The report having been accepted, on motion, the President introduced Mr. Donald McDonald, of Louisville, Ky., who read his paper on

THE GENERATION OF STEAM BY WASTE HEAT FROM WATER GAS SETS.

[For the text of Mr. McDonald's paper, see JOURNAL, Oct. 31, 1904, p. 689.]

Mr. McDonald having concluded his paper, the President suggested, that as the paper by Mr. A. B. Macbeth, of Kansas City, Mo., was on a kindred subject, it might be well to read the second so that a joint discussion might follow. No objection offering Mr. Macbeth read his notes on the

UTILIZATION OF WASTE HEAT FROM WATER GAS FOR THE GENERATION OF STEAM.

[For the text of Mr. Macbeth's paper, see JOURNAL, Oct. 31, 1904; p. 689.]

Discussion.

In concluding his paper, Mr. Macbeth explained that they were running low heats on the machines at the time the tests described were made, which would account for the apparently large amount of CO, and the low temperature at outlet to superheater. However, if higher heats had been carried in the superheater, more CO would have been consumed, but the sensible heat in the escaping gases would have increased and the results of the boiler tests probably would not have been materially changed.

The President acknowledged the great interest this subject had for him, and said that gas manufacturing had progressed to a point where savings must be made even to fractions of a cent. That anyone observing a water gas set must realize the great amount of heat going to waste through the stack, and that here was a wide field for saving. He hoped the discussion would disclose some of the lines along which a boiler should be constructed to best utilize this waste heat. Instancing the Loomis process as having a boiler through which these gases were sucked, he invited anyone having experience with that process to speak up.

Mr. J. A. Norcross, New Haven, Conn., gave some figures on the savings obtained by installing the Green fuel economizer apparatus at the New Haven works. It furnished all the water for the boilers of the water gas plant, and at a temperature of 340° to 350° F., taking the blast gases from three 8-feet 6-inch sets and reducing the temperature of these gases to an average of 365° F. For the 3 months preceding the use of the "economizer" the boiler fuel per 1,000 cubic feet of water gas was 7.35 lbs., the fuel used being coke, breeze and steam coal in about equal proportions, together with screenings from the generator cleanings. For the 3 months next after installing the economizer, with same kind of fuel, and the blast gases of only 1 water gas set running through it, the boiler fuel per 1,000 feet of gas was 5.69 lbs., or a saving of 1.66 pounds per 1,000 feet. During the next 3 months, with blast gases from two sets running through the economizer, the boiler fuel averaged 4.77 pounds per 1,000 feet—a total saving of 2.58 pounds per 1,000 cubic feet.

Mr. J. H. Taussig, Philadelphia, said the "Research Department" of the United Gas Improvement Company, of which he was a member, had worked for some time to design an apparatus for utilizing the waste heat from a water gas set and to make it a standard which could be used in those now in use as well as in future sets. Two ways of utilizing this heat suggested themselves: 1, by means of a steam regenerator, the other a steam boiler. The scheme for the regenerator was to build next the superheater a chamber similar to it, and similarly filled with checkerbrick, with a hot valve between the superheater and regenerator, and to move the stack valve from the top of the superheater to the top of the regenerator. While blowing up the hot valve was opened allowing the hot blast gases to pass from the superheater through the regenerator and out at the stack valve. When a gas run was made the stack valve and the hot valve were both closed and water, measured by a meter, was sprayed on the hot bricks of the regenerator, the steam so formed becoming highly superheated as it passed down and out to the generator through a brick-lined pipe. In this manner all the steam necessary for the set could be supplied at about the temperature of the gases leaving the superheater. There are several objections to this system. It does not admit of utilizing the heat in the illuminating gas, gives extra labor to the gas maker, and the superheated steam was apt to affect the clinker and burn out the grate bars. The deposit of fine ashes on the checkerbrick tended to create back pressure in the set while blasting, which might prove serious. Considering these things, it was decided to adopt a boiler for saving the waste heat, and one was being devised which should answer the purpose well, and at the same time be safe, economical of space, easily installed, and with its surfaces which are exposed to the hot gases readily accessible for cleaning. It consisted of a shell completely filled with tubes, set at an angle of about 15° to the horizontal, connected above by two necks to a horizontal steam drum, running the length of the boiler. By this means a large heating surface could be put in a small space, the fire tubes being entirely surrounded by water, which is kept half way up the steam drum. The surfaces of the tubes in contact with the gases are easily scraped and kept clean, while the circulation of the large body of water is as complete as in a water tube boiler. The experiments to be made with one of these boilers in the near future should do much toward solving this problem.

Mr. Joseph A. Perry, Philadelphia, called attention to an objection, against allowing the illuminating gases to pass through a boiler of this description, particularly in a residential part of a city. He thought tar or carbon would be deposited in the tubes during the run and create a nuisance when blown out during the blast. He said that, as Mr. Macbeth's figures proved a possible saving of heat from these gases of only about one-sixth as much as could be obtained from the blast gases, he would advocate utilizing the heat from the illuminating gases by placing a feed water heater in the off-take.

Mr. A. S. Miller, Baltimore, Md., said that the whole system of operating a gas plant seemed to have changed since he ran one. Then it was considered a disgrace if any CO came out of the stack, and it was considered as important to watch the stack valve as any other part of the apparatus. He thought by carrying the blast gases through a boiler more oil and generator fuel would be lost than would be saved in boiler fuel. He rather inclined toward the scheme described by Mr. Norcross, but would ask if the cost of repairs, interest on investment, etc., would not offset the saving in boiler fuel.

Mr. Norcross replied that repairs on the economizer were at first considerable, because of the difficulty in obtaining a packing for the many joints which would stand. This had been overcome and now they had no further trouble, the apparatus requiring only 10 minutes each morning to clean the tubes by giving the brushes a turn up and down. He could not give exact figures, either of repairs or of interest on investment.

Mr. W. C. Morris, Long Island City, N. Y., thought a comparison between the savings made by the Green economizer and the boiler, expressed in cents and decimals per 1,000 feet of gas, might be of interest. He said, as he understood the figures, the economizer saved about one-third the boiler fuel, which would be .3 of a cent. per 1,000, while Mr. Macbeth gave 1.1 cent as the boiler saving per 1,000 feet of gas. He thought both figures should be offset by repairs, and desired information as to their cost.

The President referred these questions to the authors of the papers. He was glad the distinction had been emphasized between the economizer at New Haven and the boiler at Louisville. In the economizer water was heated only, no evaporation being possible, while in the boiler steam was made outright. He also remarked that the Kansas City installation was merely experimental to determine how much water could be evaporated per 1,000 feet made. The results were encouraging.

Mr. A. E. Forstall, New York, called attention to a possible error in the figures which he understood to represent the weight of a cubic foot of carbonic oxide in the 3,000 feet of blast gases mentioned by Mr. Macbeth, and suggested to the members of the Association that in work on problems involving specific heats at high temperatures they would find elaborate tables on the subject in Vol. XX. of the "Proceedings" of the Association.

Mr. Macbeth explained afterward that the figures .0781, referred to by Mr. Forstall, represented the weight of 1 cubic foot of blast gas "of analysis as shown," and not that of carbonic oxide alone.

Mr. Glasgow, New York, expressed pleasure in the evidence that he and Mr. A. S. Miller were comrades still, since their toil together on similar lines in 1890. He looked with some misgivings upon the addition to a Lowe water gas apparatus of devices likely to produce additional back pressure, such as a boiler for evaporating the steam necessary to run the set. This additional pressure he was confident would increase the carbonic oxide, and he considered it a disgrace to produce more of that product than was needed. He called attention to the fact that carbon burned to CO generated but one-third the heat that it would if burned to CO_2. Consequently, in the 7.36 per cent. of CO shown in the waste gases by Mr. Macbeth, two-thirds of the carbon was wasted; or, say, 20 per cent of the total carbon necessary to consume during the blast. The volume of blast products was also increased and correspondingly a waste of sensible heat. According to Mr. Macbeth, for every 1,000 feet of carburetted water gas made there was a waste blast of 3,000 feet, without any secondary combustion in the heat recovering boiler. Instancing a properly balanced water gas set, he said: When 22-candle power gas is produced, 2,000 feet of blast products should be the amount per 1,000 feet of carburetted water gas, so the total waste would be the sensible heat of these 2,000 feet of waste gases. Whereas, under the conditions described by Mr. Macbeth, the loss was measured by the sensible heat in 3,000 feet of waste gases, plus the potential heat in 7.36 per cent. of carbon monoxide. These figures, he thought, illustrated his point that it was better to prevent waste than try and recover it after wasting by supplementing uneconomical apparatus for the purpose. He thought the whole matter resolved itself into the question: "Is it worth while to attempt to recover the sensible heat in this 2,000 feet of blast products?" He answered: "Yes; provided we do not sacrifice more than we gain." He explained how difficult it was to properly proportion a Lowe gas apparatus so that the least back pressure suitable for blasting should be secured and at the same time be able to secure the high back pressure produced by the checkerbrick required for oil gasification. Hence he deprecated the use of anything which would further obstruct blast conditions, even if the heat recovering boilers absorbed the energy of any carbonic oxide leaving the superheater; for, as Mr. McDonald had pointed out, it was generating steam with expensive generator fuel in order to save cheap boiler fuel. He did not offer these remarks with a view to discourage the commendable efforts to recover the sensible heat of the escaping blast gases, rather that he felt neither his years nor experience were sufficiently ripe to justify him in trying to guide this work into the most useful channels.

The President, apologizing for keeping the members a few minutes longer before hearing the last few words from the authors of the papers, wished to say that he was not a bit discouraged by the discussion so far, and did not shrink from embarrasment if he could save money. If the introduction of a boiler added 2 or 3 inches to the initial blast pressure the effect on cost would be small. As for carbonic oxide he thought the value of the system entirely independent of that as an additional source. Louisville had shown for years ability to run a boiler at the outlet of a water gas set and evaporate a certain amount of water right along in a successful manner. Kansas City has been able to evaporate about 38 pounds of water, without burning any carbonic oxide or extra fuel, using only the escaping products, and furnishing all the steam necessary to run the set. This, too, without increasing the generator fuel. The two things together had confirmed his faith in the economy to be derived, and he meant to try it.

Replying to the various criticisms, Mr. McDonald acknowledged that many of them were pertinent. He said the tar deposited in boiler tubes was removed by the blast without trouble. He agreed that it was better not to make carbonic oxide than to try and utilize it after being made, when if additional heat were required, soft coal would answer as well. He wished to state that though his boiler was small the addition to the blast back pressure did not amount to 1 inch. He said to be frank with the Association he would not advise attaching a boiler to the apparatus unless one could be devised more easily repaired than

the one at Louisville. Mr. Macbeth said they had no repairs to the boiler during the short time it had been in operation, but there was some heating in the connecting pipe between the bottom of the superheater and the bottom of the boiler, and he questioned the durabiliiy of the hot valves and these connections, constructed as at present.

The President, in behalf of the Association, thanked Messrs. McDonald and Macbeth for the papers presented.

On motion, a resolution to adjourn to the following morning prevailed.

[To be Continued.]

The Jeffrey Hammer Pulverizer.

The manufacture of the following described type of pulverizer has recently been taken up by the Jeffrey Manufacturing Company, of Columbus, O. It is made under the Schœllhorn-Aldrich patents, the possession of which is now in control of the Jeffrey Company. The illustrations hardly need explaining. Fig. 1 shows the pulverizer, with its interior or crushing parts; Fig. 1A shows the sectional screen frame which is one of the special features of the machine.

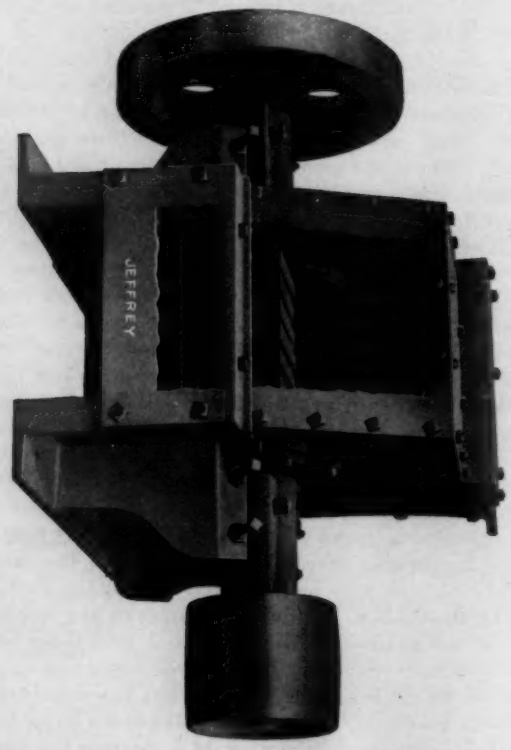

Fig. 1.

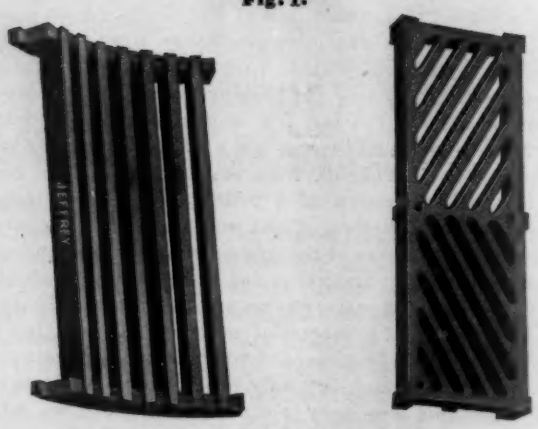

Fig. 1A.

It is designed for crushing and pulverizing material such as coal, clay, slate, rock and other like types. The manufacturers assert it is the simplest machine of its kind made, some of its strong features being its simple beater hammer, V-shaped screening surface, simple adjustment of the beater arms to accommodate wear, substantial, adjustable, dust-proof pillow blocks and top-feed hopper, insuring large capacity and permitting material to be partly crushed while in suspension, all of which go towards making the machine about as perfect for the work to be done as one could fairly expect.

Another striking feature is the accessibility of its inner parts. Removing the rear plate and the handle plates of the side of the machine makes it possible to change the beater arms as well as the screening surface when necessary. The screening surface is made up in sections, so that it is the work of but a few moments to take out or change from one size of mesh to another. As many of the machines are in practical use the experimental stage has been gone through with. The machines are made in many sizes to suit the various requirements. For instance, regarding coal the capacity varies anywhere between 50 to 100 tons per hour, depending entirely upon the degree of fineness. In pulverizing rock material the capacity ranges between 10 and 25 tons per hour.

The Jeffrey Company makes free crushing tests for interested parties, thus demonstrating before sale what the machine is capable of doing. The Jeffrey Company will be pleased to furnish illustrated descriptive catalogues of the machine on request.

(Continued from Page 811.)

Consumers' Meters.

[A paper prepared for and read at the Thirty-second Annual Meeting of the American Gas Light Association, by MR. B. H. SPANGENBERG, Philadelphia, Pa.]

As the construction of each meter proceeded, each section of channel, commencing with the meter screw, was tested for capacity. One fact established by this sectional testing was, that all overlapping edges at seams should be away from the gas flow; that is to say, the gas passing through the meter should not flow against a raised edge, but over it. Quite a difference in capacity value was noted where the raised edge was first against the gas current and afterwards changed to the opposite direction. Solder, carelessly allowed to flow through a seam, making a slightly raised obstruction on the inside of the channel, was observed to have the same effect. This fact is mentioned only to show that very slight obstructions will cause quite a difference in capacities, and that great care should be taken to prevent careless jointing of channel seams.

Our experimental meters were built by men inexperienced in the making of new meters. All metal parts were cut out and shaped by hand, and were not as perfect as could be made by machinery. The valves and seats were cast in sand moulds, which prevented the securing of dense and smooth castings such as are made in metal moulds. Perfectly dense, smooth valves and seats add largely to the capacity value, and it is more than probable that the capacities of these experimental meters is somewhat less than could be obtained with perfect fittings. However, using the materials at hand, the meters were built and tested for capacities. The results of the tests are shown in detail in Table "F" in Appendix.

On page vii, in the body of this paper, the column headed "All" shows the capacities of 50 meters of different makes, for each size from the three-light to the thirty-light inclusive. These figures are given below in comparison with the average capacities of the experimental meters:

Gas Paseed per Hour.

Size of Meter.	Losses in Inches.	Reg. Meters. Cubic Feet.	Exp. Meters. Cubic Feet.	Difference. Cubic Feet.	Per Cent. Gained.
3-light	.3	39.45	83.37	43.92	111
3 "	.4	54.60	119.53	64.93	119
3 "	.5	66.82	147.70	80.88	121
5 "	.3	67.53	140.90	73.37	109
5 "	.4	81.94	180.20	98.26	120
5 "	.5	95.84	218.60	122.76	128
10 "	.3	97.85	245.70	147.85	151
10 "	.4	121.00	318.20	197.20	163
10 "	.5	141.84	378.20	236.36	167
20 "	.3	147.43	386.40	238.97	162
20 "	.4	187.15	525.20	338.05	181
20 "	.5	218.04	603.60	385.56	177
30 "	.3	198.59	568.37	369.78	186
30 "	.4	244.46	764.53	520.07	213
30 "	.5	287.53	879.60	592.07	206

The above figures verify my previous statement that, using practically the same material and labor per meter, the capacities of some meters can be trebled.

Assuming that a schedule for using meters is based on a loss of .5 inch in pressure, the 5-light size of these experimental meters will do the work of any of the present sizes from the 3-light to the 20-light inclusive; also, the 30-light size experimental meter will do the work of any of the present sizes from the 30-light to the 100-light inclusive (capacity tests of the largest 100-lights now made show an average capacity of 875 cubic feet per hour, with .5 inch loss in pressure). Consequently, with .5 inch loss in pressure, two sizes of the new styles (the 5-light and the 30-light sizes) could be used to the best advantage to re-

place eight present sizes, namely: the 3, 5, 10, 20, 30, 45, 60 and 100-light sizes.

This concludes this portion of the paper.

Sixth Section.

A Plea for Uniformity.—In the previous divisions of this paper, the writer has tried to make clear the annoyances and money losses resulting from the lack of uniformity in meters. If he has succeeded, the facts speak for themselves, and are the best plea that could be made for the adoption of a standard. He has also endeavored to establish data for an ultimate standard, that in itself would least interfere with present conditions.

Any standard, even one which would secure no improvement over the present average efficiency of the machine, would undoubtedly save thousands of dollars.

Leaving out of the question all higher considerations, and descending to the sordid plane of "money saved," * * * let us come together and decide to save these dollars.

Appendix.

This appendix contains the following data:

Table "A" shows the results of tests for capacities in cubic feet per hour of 1,470 meters—each meter being tested with differential inlet and outlet pressures of .3 inch, .4 inch and .5 inch, making a total of 4,410 individual tests.

These meters were of the following numbers and sizes:

50	3-light meters	from	7	different	makers	 350	meters.
50	5-light	"	7	"	"	 350	"
50	10-light	"	7	"	"	 350	"
30	20-light	"	7	"	"	 210	"
30	30 light	"	7	"	"	 210	"
					Total,	1,470	

Each page contains the results of the tests of one size of meter of each make.

Table "B" shows the dimensions of each size and of each make of the above-mentioned meters.

Table "E" shows a test to determine the relative capacities of 30 5-light meters, 10 each of 3 different makes—fitted first with regular-size diaphragms, and second with special-size diaphragms.

Table "F" shows capacities per hour of 30 experimental meters.

The closing sets of illustrations consist of drawings of valves and valve seats, valves being in sectional elevation, seats in plan. These are representations of valves and seats taken from the meters shown in Table "A" and Table "F"—all being me ers of the year 1904.

Table "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 1.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	40.20	58.20	67.80	26	32.40	56.40	64.80
2	50.40	60.60	75.00	27	33.00	54.00	68.40
3	48.00	59.40	74.40	28	46.80	54.60	72.00
4	44.40	62.40	75.00	29	46.20	58.20	73.20
5	34.20	53.40	66.00	30	25.20	45.00	62.40
6	39.60	56.40	72.60	31	36.00	57.00	69.00
7	51.60	67.80	78.00	32	39.00	60.00	70.80
8	45.00	63.00	75.60	33	27.60	49.80	67.20
9	39.60	57.00	69.60	34	36.00	51.60	67.80
10	50.40	67.20	75.60	35	40.80	55.20	68.40
11	30.60	49.80	61.80	36	32.40	51.60	63.60
12	48.00	63.60	76.20	37	38.40	52.20	64.80
13	43.80	61.20	69.60	38	42.60	55.20	66.00
14	39.60	57.00	73.80	39	32.40	48.00	65.40
15	45.00	60.00	72.60	40	34.80	55.20	69.60
16	49.80	62.40	76.80	41	27.60	49.80	64 80
17	43.20	61.80	75.00	42	48.60	68.40	75.60
18	40.80	57.60	73.20	43	*57.00	68.40	81.00
19	47.40	60.60	73.20	44	50.40	6-.40	81.00
20	46.80	62.40	73.80	45	54.00	*68.40	*81.60
21	43.80	61.80	75.00	46	43.80	54.60	69.60
22	52.80	67.80	78.00	47	45.60	61.80	70.20
23	39.60	54.00	66.00	48	36.00	52.80	68.40
24	45.00	57.00	72.00	49	†15.60	†34.20	†60.60
25	27.00	49.20	64.80	50	36.60	51.60	64.80
	1,086.60	1,491.60	1,811.40		958.80	1,382.40	1,731.00
Totals of first half					1,086.60	1,491.60	1,811.40
Grand total					2,045.40	2,874.00	3,542.40
Average capacity per hour per meter					40.91	57.48	70.85
*Maximum " " any "					57.00	68.40	81.60
†Minimum " " " "					15.60	34.20	60.60

Average temperature, 78° F.

Table "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 2.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	31.20	*52.20	61.20	26	33.60	48.60	61.20
2	34.80	43 20	56.40	27	20.40	†36.00	55.80
3	30.00	46.80	61 20	28	30.00	45.00	57.00
4	28.80	45.00	58.80	29	30.60	50.40	61.20
5	24.60	36.60	55 80	30	33.00	49.20	59.40
6	30.00	49.20	63.60	31	18.00	42.00	57.60
7	27.00	46 80	61.20	32	30.60	49.80	55 20
8	33.00	49.20	63.00	33	†10.20	37.20	54.00
9	31.20	47 40	63.00	34	25.20	44 40	58.20
10	12.60	44.40	54.00	35	14.40	38.40	49.80
11	*37.80	49 80	58.80	36	34.80	45.00	55 20
12	34.20	50.40	63 00	37	37.20	51.00	63 00
13	25.80	48.00	62 40	38	17.40	37.80	52.80
14	19.80	38.40	55.80	39	22.80	38.40	51.60
15	36.00	51.00	62.40	40	33.00	49 20	62.40
16	42.00	51 60	*64.80	41	31.80	46 20	60.00
17	33.60	48.60	63.00	42	25 80	45.60	58.20
18	14.40	29.40	†46.80	43	20.40	42.00	61.20
19	33.60	49 20	62.40	44	28.80	46.80	57.60
20	30.00	47.40	58.80	45	28.20	51.60	58.80
21	36.60	51.00	61.80	46	32 40	51.00	57.00
22	28 80	47.40	58.20	47	31.80	46.80	56.40
23	19 80	38.40	58.20	48	20.40	41.40	54.00
24	37.20	51.00	58.20	49	32.40	47.40	62.40
25	36.00	51.60	58.80	50	26.40	46.80	62.40
	748.80	1,164.00	1,491.60		669.60	1,128.00	1,442.40
Totals of first half					748.80	1,164.00	1,491.60
Grand total					1,418.40	2,292.00	2,934.00
Average capacity per hour per meter					28.37	45.84	58.68
*Maximum " " any "					37.80	52.20	64.80
†Minimum " " " "					10.20	36.00	46.80

Average temperature, 84° F.

Table "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 3.

Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	54.60	*73.20	81.60	26	34.80	58.80	72.60
2	41.40	58.80	78.00	27	49.20	68.40	80.40
3	41.40	58.80	78.00	28	50.40	63.60	78.00
4	44.40	64.40	80.40	29	*55.20	68.40	81.00
5	48.00	60.60	76.20	30	50.40	63.60	79.80
6	42.00	59.40	75.60	31	40 80	64.80	81.60
7	47.40	61.80	79.80	32	36.00	54.60	69 60
8	47.40	66.00	81.00	33	42.60	67.20	81.60
9	42.00	51.60	68.40	34	49.20	66.60	84.00
10	40.80	56.80	76.80	35	24.60	†48.60	69.00
11	49.20	61.20	78.00	36	37.80	56.40	76.20
12	52.20	64.80	82.20	37	55.20	68.40	83.40
13	42.00	51.60	74.40	38	43.20	56.40	67.20
14	37 20	56.80	70.20	39	45.60	63.60	78.00
15	39.00	57.60	74.40	40	48.00	62.40	76.80
16	38.40	58 80	72.60	41	45.60	63.00	78.00
17	49.20	63.60	79.80	42	54.00	67.20	*85.80
18	40.80	58.80	72.00	43	45.00	63.60	78.00
19	†21.00	50.40	†64.20	44	42.00	63.60	78.00
20	37.80	58.20	70.20	45	43.80	62.40	81.60
21	48.00	65.40	80.40	46	38.40	58.80	78.00
22	49.20	65.40	79 80	47	49.80	68.40	82.20
23	39.60	57.60	75.60	48	38.40	54.00	70.80
24	52.20	66.60	78.00	49	44.40	61.20	79.20
25	49.80	67.20	81.00	50	49.20	63.60	79.20
	1,095.00	1,523.40	1,908.60		1,113.60	1,557.60	1,950.00
Totals of first half					1,095.00	1,523.40	1,908.60
Grand total					2,208.60	3,081.00	3,858.60
Average capacity per hour per meter					44.17	61.62	77.17
*Maximum " " any "					55 20	73.20	85.80
†Minimum " " " "					21.00	48.60	64.20

Average temperature, 79° F.

TABLE "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 4.

Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	39.00	49.20	09.40	26	40.20	54.60	60.60
2	40.80	54.60	61 20	27	40.80	50.40	63.60
3	33.60	†44.40	58.80	28	45.00	53.40	60.60
4	33.00	46.80	58.80	29	44.40	54.00	63.60
5	37.20	46.80	56.40	30	42.60	54.00	67.20
6	33.00	49.20	59.40	31	40.20	54.00	63.60
7	40.80	55.20	66.00	32	36.00	51.00	62.40
8	38 40	46.80	62.40	33	38.40	51.60	63.00
9	†27.00	47.40	57 00	34	36.60	50.40	64.20
10	36.00	50.40	64 80	35	40.20	54.00	64.80
11	40.80	52.80	62.40	36	39.60	56.40	63.60
12	34.80	47.40	58.20	37	36.60	56.40	63.00
13	34 80	49.20	59.40	38	39.00	49.80	57.60
14	37.20	55.20	59.40	39	43.20	54.00	63.60
15	39 60	50.40	62.40	40	44.40	54.60	64.80
16	37.80	52.80	58.80	41	33.60	49.80	60.00
17	39.60	53.40	66.60	42	38.40	54.00	63.00
18	39.00	52.80	64.80	43	38.40	52.20	†55.80
19	34.80	48.60	62.40	44	43 80	54.00	63.60
20	39.00	53.40	59.40	45	45.00	52.80	64.20
21	34.80	46.80	60.00	46	*46.80	54.60	63.00
22	45.00	50.40	63.00	47	39.00	50.40	61.20
23	39.00	50.40	60.00	48	39.60	48.60	62.40
24	37.80	48.00	59.40	49	44.40	52.20	61.80
25	43.20	*56.40	*67.20	50	38.40	47.40	57.60
	936.00	1,258.80	1,527.60		1,014.60	1,314.60	1,558.80
Totals of first half					936.00	1,258.80	1,527.60
Grand total					1,950.60	2,573.40	3.086.40
Average capacity per hour per meter					39.01	51.47	61.73
*Maximum " " any "					46.80	56.40	67.20
†Minimum " " " "					27.00	44.40	55.80

Average temperature, 78° F.

TABLE "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 6.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	44.00	61.20	69.60	26	43.80	60.00	70.80
2	48.00	60.60	71.40	27	36.00	57.60	67.20
3	40.80	60.60	69.00	28	34.20	57.00	64.80
4	36.60	57.60	66.00	29	42.00	55.80	68.40
5	47.40	58.80	72.00	30	36.00	56.40	64.20
6	48.00	61.20	68.40	31	36.60	51.60	63.60
7	48.00	61.20	70.80	32	45 00	60.00	69.60
8	47.40	60.00	70.80	33	46.80	60.60	70 80
9	†26.40	†47.40	†57.60	34	45.00	59.40	70.80
10	38.40	51 60	67.20	35	42.00	55.80	69.00
11	50.40	63.00	72.00	36	38.40	54.60	66.00
12	43.80	59.40	70.20	37	47.40	60.00	70.80
13	46.80	57.00	68.40	38	36.00	57.60	64 80
14	37.80	57.60	68.40	39	37.20	57.00	66.00
15	45.00	55.80	66 60	40	26.40	48.60	60.60
16	40.80	60.00	66.60	41	42.60	54.60	67.20
17	39 00	60.00	70.80	42	43.20	55.80	73.20
18	26.40	48.00	59.40	43	45.60	59.40	70.20
19	38.40	55.80	67.20	44	44.40	58.20	68.40
20	36.00	57.30	70.80	45	51.60	63.00	74.40
21	4.40	60.00	69.60	46	*55.80	*64.80	*76.80
22	30.60	57.00	62.40	47	38.40	57.00	66.00
23	27.60	49.20	58.80	48	42.00	54.00	68.40
24	39.60	61.20	68.40	49	52.80	64.20	73.20
25	27.00	48.00	62.40	50	37.20	51.00	63.60
	999.00	1,429.50	1,684,80		1,046.40	1,434.00	1,708.80
Totals of first half					999.00	1,429.50	1,684.80
Grand total					2.045.40	2,863.50	3,393 60
Average capacity per hour per meter					40 90	57 27	67.87
*Maximum " " " any "					55.80	64.80	76.80
†Minimum " " " " "					26.40	47.40	57.60

Average temperature, 76° F.

TABLE "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 5.

Meter Tested. No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	39.00	57.00	68.40	26	†28.20	49.80	58.80
2	38.40	50.40	69.60	27	34.80	50.40	66.00
3	46.80	55.20	69.00	28	45.00	55.20	64.80
4	46.80	54.60	69.00	29	44.40	52.20	67.20
5	42.00	51.60	70.20	30	36.00	49.80	63.60
6	45.00	57.00	69.60	31	40.80	50.40	62.40
7	46.80	58.80	73.20	32	44.40	57.00	69.00
8	47.40	60.00	72 60	33	33.00	48.60	58.80
9	43.20	52.20	63.60	34	34.80	50.40	60.00
10	42.00	52.80	61.20	35	40.80	57.00	67.20
11	44.40	55 20	63.60	36	45.00	57.00	68.40
12	39.00	52.80	66.60	37	37.80	54.60	67.20
13	41.40	54.00	66.00	38	30.00	†40.80	58.80
14	32.40	51.60	67.20	39	31.80	51.60	63.60
15	*52.20	*69.00	*75.60	40	39.00	57.00	68.40
16	33.00	51.60	67.20	41	34.20	49.80	†56.40
17	34.80	48.00	61.20	42	36.60	54.00	66.00
18	34.20	52.80	67.20	43	36 00	52.80	63.00
19	33.60	50.40	61.80	44	31.80	44.40	58.80
20	42.00	54.00	67.20	45	38 40	53.40	66 00
21	49.20	57.00	69.60	46	37.20	54.00	68.40
22	40.80	52.80	66.00	47	30.60	45.00	61.20
23	36.60	51.60	65.40	48	32 40	49.20	58.80
24	34.20	50.40	63.00	49	43 20	54.60	66 00
25	39.00	52.80	63.60	50	28.80	45 00	58.80
	1,024.20	1,353.60	1,677.60		915.00	1,284.00	1,587.60
Totals of first half					1,024.20	1,353.60	1,677.60
Grand total					1,939.20	2,637.60	3,265.20
Average capacity per hour per meter					38.78	52.75	65.34
*Maximum " " " any "					69.00	52.20	75.60
†Minimum " " " " "					28.20	40.80	56.40

Average temperature, 77° F.

TABLE "A."

Showing the Test of Fifty 3-Light Meters of Maker No. 7.

Meter Tested. No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	48.00	57.60	66.00	26	43.20	53.40	65.40
2	46.20	56.40	66.60	27	40.80	53.40	61.80
3	36.00	57.00	66.60	28	39.00	54.00	65.40
4	42.60	55.80	68.40	29	44.40	†52.80	†61.20
5	*49.20	*58 80	64.80	30	47.40	58 80	69.60
6	43.20	54.60	67 20	31	45.00	58.20	70.80
7	42.60	53.40	66.00	32	40.80	54.60	64.80
8	45.60	55.20	67.20	33	49.20	55.50	68.40
9	46.80	55.80	66.00	34	45.00	54.60	66.00
10	†33.60	55.20	64.80	35	43.80	54.60	62.40
11	48.00	56.40	65.40	36	44.40	56.40	63.60
12	38.40	56.40	68.40	37	46.80	57.60	65.40
13	45.00	54.60	63.00	38	45.60	55.20	64.80
14	49.20	58 20	66.00	39	43.20	54.60	63.60
15	47.40	57.00	67.80	40	43.80	56.40	64.80
16	48.00	55.20	67.20	41	48.00	57.60	68.40
17	40.20	54.00	63.60	42	47.40	58.80	66.60
18	43.20	54.00	68.40	43	48.00	58.80	69.60
19	40.20	53.40	63.00	44	38.40	54.60	66.00
20	43.80	54.00	66.00	45	44.40	55.80	67.20
21	38.40	55.20	66.00	46	48.00	56.40	66 60
22	38.40	54.60	63.60	47	44.40	58.80	69.60
23	38.40	54.30	62.40	48	47.40	55.80	66.00
24	39.60	56.40	64.80	49	48.00	55.80	68.40
25	47.40	57.00	*70.80	50	45.60	57.00	67.80
	1,079.40	1,390.50	1,650.00		1,122.00	1,399.50	1,654.20
Totals of first half					1,079.40	1,390.50	1,650.00
Grand total					2,201.40	2,790.00	3,304.20
Average capacity per hour per meter					44.03	55.80	66.08
*Maximum " " " any "					49.20	58.80	70.80
†Minimum " " " " "					33.60	52.80	61.20

Average temperature, 76° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 1.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	75.60	†86.40	100.80	26	77.40	90.60	102.60
2	74.40	88.80	101.40	27	73.80	91.20	104.40
3	75.00	92.40	99.60	28	72.00	90.60	102.00
4	76.80	92.40	102.00	29	72.30	91.20	99.00
5	82.80	94.80	107.40	30	75.00	93.40	111.00
6	72.60	87.00	98.40	31	75.00	92.40	103.20
7	74.40	88.20	103.20	32	73.20	91.20	102.00
8	81.60	94.20	109.20	33	72.00	90.00	102.00
9	69.60	92.40	†98.40	34	81.60	92.40	111.00
10	†66.00	91.80	99.00	35	75.00	91.80	109.20
11	73.20	87.00	99.00	36	*85.20	93.60	106.80
12	81.00	94.20	103.80	37	78.00	91.80	104.40
13	80.40	93.60	105.00	38	82.80	93.00	105.00
14	73.80	87.60	104.40	39	74.40	93.00	105.60
15	78.00	86.40	102.00	40	79.20	91.80	102.00
16	79.20	92.80	108.60	41	69.00	91.80	103.20
17	79.80	93.00	105.60	42	75.60	92.40	105.00
18	80.40	93.40	100.80	43	78.00	92.40	103.20
19	82.20	94.20	106.80	44	82.80	93.00	105.00
20	80.40	88.80	103.80	45	78.00	91.80	*112.80
21	74.40	89.40	104.40	46	78.00	91.80	106.20
22	84.60	90.60	100.80	47	77.40	90.60	108.00
23	80.40	*95.40	110.40	48	79.80	91.80	106.20
24	78.60	88.80	104.40	49	79.20	91.80	106.20
25	70.80	91.80	105.60	50	82.80	92.40	109.80
	1,926.00	2,275.40	2,584.80		1,927.50	2,297.80	2,635.80
Totals of first half					1,926.00	2,275.40	2,584.80
Grand total					3,853.50	4,573.20	5,220.60
Average capacity per hour per meter					77.07	91.46	104.41
*Maximum " " " any "					85.20	95.40	112.80
†Minimum " " " " "					66.00	86.40	98.40

Average temperature, 79° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 3.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	57.00	70.80	81.60	26	51.00	74.40	84.00
2	60.00	74.40	84.00	27	62.40	76.20	84.00
3	60.00	72.00	82.20	28	55.20	70.20	84.00
4	61.80	69.60	81.60	29	61.80	74.40	90.00
5	60.00	73.80	87.60	30	55.80	67.80	90.00
6	64.20	77.40	85.20	31	51.60	72.00	84.60
7	63.60	76.20	84.60	32	61.20	69.00	86.40
8	60.60	72.00	88.80	33	55.20	69.00	86.40
9	61.20	70.20	88.80	34	66.60	76.80	93.00
10	56.40	69.00	87.00	35	58.20	70.80	87.00
11	60.60	73.20	92.40	36	54.00	68.40	84.60
12	57.00	70.20	84.60	37	51.00	69.60	80.40
13	54.60	69.00	84.60	38	50.40	70.20	†79.20
14	67.20	76.20	*94.80	39	63.60	76.20	89.40
15	66.00	77.40	93.60	40	58.80	72.00	85.20
16	54.00	67.80	87.00	41	66.60	75.00	90.90
17	67.20	76.80	88.80	42	65.40	75.00	89.40
18	63.00	75.60	84.60	43	†46.80	†61.20	84.00
19	54.00	74.40	82.80	44	60.00	73.20	84.00
20	61.20	74.40	87.00	45	61.20	*78.00	90.00
21	56.40	72.60	87.60	46	62.40	75.60	89.40
22	62.40	76.80	93.60	47	66.60	75.60	93.00
23	50.40	71.40	88.20	48	68.40	76.20	94.80
24	*68.40	76.80	88.80	49	67.80	76.20	93.60
25	60.60	73.80	91.20	50	57.60	71.40	87.60
	1,507.80	1,831.80	2,181.00		1,479.60	1,814.40	2,184.90
Totals of first half					1,507.80	1,831.80	2,181.00
Grand total					2,987.40	3,646.20	4,365.90
Average capacity per hour per meter					59.75	72.92	87.32
*Maximum " " " any "					68.40	78.00	94.80
†Minimum " " " "					46.80	61.20	79.20

Average temperature, 74° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 2.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	59.40	70.80	80.40	26	52.80	68.40	87.00
2	57.60	66.00	84.60	27	48.00	60.00	78.00
3	54.00	65.40	81.00	28	50.40	64.20	83.40
4	54.00	69.00	83.40	29	48.00	61.20	81.00
5	52.80	70.80	82.80	30	58.80	66.60	81.60
6	57.60	66.60	83.40	31	56.40	66.00	81.00
7	56.40	68.40	81.60	32	55.80	66.00	84.00
8	61.20	70.80	80.40	33	51.00	66.00	82.80
9	53.40	63.60	78.00	34	54.00	66.00	79.80
10	52.80	70.20	78.00	35	51.60	68.40	79.80
11	57.00	66.60	84.00	36	51.00	67.20	80.40
12	54.00	66.00	86.40	37	52.20	67.80	81.60
13	51.60	67.20	79.80	38	48.60	62.40	81.00
14	*67.80	*75.00	86.40	39	48.60	†59.40	76.80
15	53.40	67.80	81.00	40	45.00	59.40	76.80
16	52.80	69.60	75.00	41	48.00	63.00	79.20
17	62.40	72.60	86.40	42	45.00	64.80	†74.40
18	61.20	71.40	86.40	43	48.00	65.40	79.20
19	60.00	70.80	81.00	44	49.20	67.20	75.60
20	51.00	69.00	80.40	45	46.80	61.20	78.00
21	53.40	67.20	84.00	46	46.80	60.00	76.80
22	57.60	66.00	81.00	47	50.40	63.00	76.80
23	63.60	70.80	87.00	48	†43.20	59.40	75.60
24	51.60	60.60	81.60	49	48.00	64.80	75.60
25	58.80	67.20	*88.20	50	46.20	60.60	80.40
	1,415.40	1,718.40	2,062.20		1,243.80	1,598.40	1,986.60
Totals of first half					1,415.40	1,718.40	2,062.20
Grand total					2,659.20	3,316.80	4,048.80
Average capacity per hour per meter					53.18	66.30	80.97
*Maximum " " any "					67.80	75.00	88.20
†Minimum " " " "					43.20	59.40	74.40

Average temperature, 81° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 4.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tefted, No.	Capacity per Hour Under Loss of Pressure of 3-10-In.	4-10-In.	5-10-In.
1	65.40	76.80	92.40	26	62.40	76.20	86.40
2	48.00	72.60	84.00	27	51.60	70.20	84.60
3	54.00	73.20	84.00	28	50.40	69.00	89.40
4	58.80	72.60	84.00	29	63.60	78.60	91.80
5	*69.00	79.20	90.60	30	60.60	79.20	88.80
6	61.20	78.00	*93.60	31	60.60	72.00	88.80
7	61.80	74.40	93.60	32	62.40	75.60	86.40
8	56.40	73.80	86.40	33	60.00	69.00	87.00
9	57.00	74.40	88.20	34	60.60	72.60	90.00
10	60.00	73.80	87.60	35	63.60	76.80	92.40
11	57.60	74.40	89.40	36	63.00	78.00	88.80
12	63.60	*79.80	93.60	37	59.40	73.20	90.00
13	†42.00	†64.80	†80.40	38	60.00	70.80	87.00
14	54.00	72.60	84.00	39	64.80	75.60	91.20
15	62.40	78.60	91.20	40	60.00	71.40	90.60
16	59.40	73.20	93.00	41	58.80	70.80	91.20
17	54.00	72.60	88.20	42	64.80	75.00	90.00
18	50.40	69.00	81.00	43	55.80	70.80	87.60
19	52.80	71.40	87.00	44	55.20	69.60	88.80
20	60.00	72.00	87.00	45	50.40	68.40	84.00
21	57.00	70.20	86.40	46	64.80	78.60	93.60
22	63.60	79.20	88.80	47	61.20	71.40	91.80
23	54.00	78.60	90.60	48	62.40	75.00	90.00
24	59.40	74.40	87.00	49	55.80	72.00	87.00
25	61.20	75.60	88.80	50	51.00	72.60	85.20
	1,443.00	1,855.20	2,200.80		1,486.20	1,832.40	2,222.40
Totals of first half					1,443.00	1,855.20	2,200.80
Grand total					2,929.20	3,687.60	4,423.20
Average capacity per hour per meter					58.58	73.75	88.46
*Maximum " " any "					69.00	79.80	93.60
†Minimum " " " "					42.00	64.80	80.40

Average temperature, 75° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 5.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	60.60	†81.60	99.60	26	72.60	87.00	101.40
2	76.80	92.40	103.20	27	69.60	93.00	96.00
3	79.80	93.60	109.80	28	62.40	86.40	103.20
4	73.20	90.00	103.20	29	66.00	92.40	103.80
5	71.40	85.80	98.40	30	78.00	93.00	105.00
6	*84.00	92.40	105.60	31	75.60	92.40	106.80
7	75.60	91.20	109.20	32	73 20	90.60	105.00
8	66.60	88.80	104.40	33	69.00	92.40	102.00
9	69.00	92.40	102.60	34	63.60	84.60	94.20
10	72.00	86.40	105.60	35	73.20	91.20	104.40
11	68.40	89.40	103.80	36	60.00	82.80	99.60
12	78.00	91.80	103.80	37	73.20	91.20	103.20
13	75.00	91.80	106.20	38	72.00	87.00	103.20
14	66.60	91.80	102.00	39	73.20	90.60	103.80
15	69.00	93.00	103.00	40	75.60	93.00	106.20
16	72.60	*94.20	103.20	41	73.80	93.00	104.40
17	67.20	88.80	99.00	42	73.20	91.80	102.00
18	75.00	92.40	102.00	43	69.00	93.00	106.20
19	72.00	93.00	103.80	44	73.20	90.60	104.40
20	69.00	92.40	103.20	45	75.00	91.20	102.00
21	61.20	84.60	102.00	46	72.00	87.60	102.00
22	69.00	92.40	97.80	47	72.00	88.20	105.00
23	†60.00	82.20	†93.60	48	78.00	93.60	*111.00
24	66.60	91.20	100.20	49	76.80	92.40	100.80
25	62.40	85.20	96.00	50	70.80	86.40	103.20
	1,761.00	2,248.80	2,561.40		1,791.00	2,255.40	2,578.80
Totals of first half					1,761.00	2,248.80	2,561.40
Grand total					3,552.00	4,504.20	5,140.20
Average capacity per hour per meter					71.04	90.09	102.86
*Maximum " " any "					84.00	94.20	111.00
†Minimum " " " "					60.00	81.60	93.60

Average temperature, 71° F.

TABLE "A,"

Showing the Test of Fifty 5-Light Meters of Maker No. 7.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	75.60	89.40	‡88.20	26	71.40	86.40	100.20
2	76.20	90.00	103.80	27	72.00	86.40	98.40
3	77.40	88.20	102.00	28	69.60	84.40	97.80
4	72.00	86 40	100.80	29	75.60	91.20	100 80
5	78.00	93 00	106.80	30	72.00	85.20	99.60
6	75.00	*93.20	*108.00	31	72.00	85.80	97.80
7	65.60	84 40	96.00	32	73.20	86.40	99.00
8	76.80	85.20	97.20	33	74.40	87.00	101.40
9	75.60	90.30	99.60	34	76.80	86.40	97.20
10	75.00	93.00	96.00	35	69.60	83.80	96.60
11	67.20	79.80	91.20	36	82.80	91.20	96.60
12	64.80	76.20	94.80	37	80.40	90.00	94.20
13	71.40	85.80	99.00	38	76.80	87.00	102.00
14	73.20	87.00	93.00	39	78.00	92.40	102.00
15	72.00	86.40	96.00	40	73.20	87.00	99.60
16	74.40	87.00	97.20	41	72.00	87.00	99.00
17	76.20	85.80	92.40	42	66.00	84.00	96.00
18	71 40	84 60	93.60	43	67.80	79.20	93.00
19	70.80	85.80	95.40	44	68.40	†72.60	96.60
20	73.80	86 40	97.80	45	62.40	77.40	93.00
21	67.20	79.80	95.40	46	†58.80	67.80	90.00
22	69 60	84.40	93.60	47	67.80	79.20	94.20
23	66 00	78.00	91.20	48	63.00	76.80	90.00
24	72.00	86.40	98.40	49	63.60	76.80	92.40
25	*82.80	91.20	97.20	50	62.40	72.60	90.00
	1,818.00	2,157.70	2,424.60		1,770.00	2,084.00	2,416.80
Totals of first half					1,818.00	2,157.70	2,424,60
Grand total					3,588.00	4,241.70	4,841.40
Average capacity per hour per meter.					71.76	84.83	96.83
*Maximum " " any "					82.80	93.20	108.00
†Minimum " " " "					58.80	72.60	88.20

Average temperature, 82° F.

TABLE "A."

Showing the Test of Fifty 5-Light Meters of Maker No. 6.

Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.	Meter Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	84.00	95.40	112.80	26	86.40	94.20	111.60
2	73.20	91.20	106.80	27	87.60	95.40	*116.40
3	75.00	96.00	111.00	28	77.40	93 60	105.60
4	79.20	92.40	109.20	29	81.60	98.40	110.40
5	85.80	*99.60	109.20	30	80.40	91.80	114.60
6	76.20	95.40	109.20	31	85.20	94.20	113.40
7	76.20	94.80	108.00	32	84.00	99.00	111.00
8	79.20	91.20	108.00	33	84.00	96.60	110.40
9	81.00	98.40	110.40	34	80.40	91.20	114.00
10	86.40	95.40	111.60	35	79.20	94.80	114.00
11	80.40	92.40	110.40	36	84.00	97.20	111.60
12	84.00	95.40	108.00	37	84.00	91.80	114.00
13	†70.20	90.60	†102.60	38	84.00	97.20	111.60
14	75.60	94.20	103.80	39	78.00	93.00	105.60
15	71.40	91.20	110.40	40	76.20	94.80	109.80
16	80.40	92.40	111.00	41	85.20	97.20	111.60
17	83.40	94.80	104.40	42	82.80	94.20	112.80
18	80.40	92.40	106.80	43	87.60	96.60	112.20
19	84.00	95.40	114.60	44	82.80	91.80	109.20
20	*87.60	96.00	112.20	45	84.60	96.60	111.00
21	84.00	94.20	109.20	46	82.20	†90.00	107.40
22	84.00	95.40	106.80	47	79.80	97.20	110.40
23	78.00	95.40	111.00	48	85.20	97.80	111.00
24	76.80	94.80	105.60	49	80.40	98.40	109.20
25	82.80	92.40	109.20	50	85.20	98.40	114.00
	1,999.20	2,356.80	2,722.20		2,068.20	2,381.40	2,782.80
Totals of first half					1,999.20	2,356.80	2,722.20
Grand total					4,067.40	4,738.20	5,505.00
Average capacity per hour per meter.					81.35	94.76	110.10
*Maximum " " any "					87.60	99.60	116.40
†Minimum " " " "					70.20	90.00	102.60

Average temperature, 74° F.

(To be Continued.)

The Revivification of Oxide in Situ.

[A paper read by MR. JAMES BELL, before the Scottish Junior Gas Association.]

In the early days of gas manufacture, lime in the form of "lime water" or "cream of lime" was used for purifying gas, so as to deprive it of all disagreeable odor during combustion, and about the year 1808 machinery was introduced for the purpose of keeping the mixture of lime and water in a constant state of agitation. The refuse material, or "blue billy," as it was called, was not easily disposed of, and gave rise to considerable trouble, and the system gradua lly disappeared in favor of the dry lime process, which was introduced by Reuben Phillips, of Exeter, in 1817. We are indebted to John Malam for the perfecting of Phillips' apparatus. The arrangement of purifiers and center valve patented by him in 1823, for working purifiers in sets of four, with one out of action, is the form used in most works at the present time.

The use of oxide of iron for purifying gas from H_2S was experimented with on a large scale at the Chartered Gas Company's works in 1849. During the experiments the revivification of the material was accidentally discovered, and the first trial of "revivification *in situ*" took place in October of that year. But later in the same year they found that the gas was passing through the material unpurified, and investigation proved that the inactivity of the oxide was due to the low temperature experienced during the winter season.

Oxide of iron is now used, alone or in conjunction with lime, in most of the gas works in England, and in a few works in Scotland.

The spent lime from the dry process contained a greater amount of ammonia, in the early days of its use, than it does in present day manufacture, owing to this impurity being now absorbed before it reaches the purifiers, and there is therefore not the same ready market for the spent lime for agricultural purposes as formerly. In many cases the difficulty of disposing of the spent lime is now a serious one, and it was this difficulty that led to the introduction of oxide of iron at Airdrie, for it

was found that the space required for revivifying oxide of iron by exposure in the usual way was no greater than the accommodation required for storing spent lime, while awaiting the opportunity of disposal.

The purifiers at Airdrie are 4 in number, and controlled by a center valve (similar to that patented by Malam), working 3 on and 1 off. The boxes are 16 feet square, containing 3 tiers of sieves, each box having an area of 768 square feet of purifying surface, making the total purifying area of the 3 boxes 2,304 square feet. The material is placed about 8 inches deep. The oxide of iron in use is an artificial oxide, a by-product obtainable from the manufacturing chemist. As delivered at the gas works, it is in a dense, black, powdery form, very much resembling soot, and it has to be mixed with an equal bulk of sawdust so as to keep the oxide in an open condition, to allow the gas a free passage. Water has also to be added till the material attains nearly the same consistency as lime when ready for the purifiers.

The first experiment was made by filling each alternate box with lime and oxide, but we gradually discarded the lime altogether in favor of the oxide. At first, we revivified the oxide in the usual way, *i.e.*, by emptying the boxes and exposing the fouled oxide to the action of the atmosphere. I may here mention that when turning oxide of iron of this nature out of the boxes for the first time it is of the utmost importance that the purifiers should be emptied speedily, as this oxide, when exposed to the action of the air, absorbs the oxygen so rapidly that it generates heat sufficient to render the mass red hot. To guard against the difficulties which arise from low temperature we have introduced steam into each purifier, and have thermometers fixed on to the covers of each purifier to ascertain the temperature, and regulate accordingly.

The first experimental apparatus used at Airdrie for introducing the air supply took the form of a sealed vessel, placed at the inlet of the exhauster; the gas being under vacuum at this point, the air was sucked or drawn through. We had no means then for measuring the supply of air, the sealed vessel being placed there to prevent the escape of gas, should there be any falling off in the exhausting. Owing to the variations of exhaust at the point of suction this method of admitting air proved unsatisfactory.

It was next resolved to try the same experiments at the inlet of the condensers, this time connecting a meter so that we could register the amount of air passed through; but the vacuum at the inlet of condensers being insufficient to draw in air through the meter, we introduced a steam jet at a point between the meter and inlet of condensers, acting on the same principle as the steam jet exhauster, and this gave the desired results. We found by this improvement that we could draw in through the meter, with regularity, as much air as was necessary for our requirements. The introduction of a limited quantity of air by this apparatus, in the manner described, while working the purifiers in the usual way, only assisted in prolonging the period between the changes, and the process of changing continued in the same rotation as before the introduction of the air experiments.

To do away with the necessity of emptying the idle box, for subjecting the material to the action of air, we fitted up another apparatus for blowing air into the inlet of the idle purifier, this blower being in the form of a steam jet, blowing into a pipe of 1¼-inch internal diameter, and connected with branch pipes led into the inlet of each purifier. Each branch is supplied with a valve. Only one valve is opened at one time, and that being on the inlet of the idle purifier, it is necessary to draw the plugs of the purifier covers so that the air can pass freely through the purifying material and escape at the plug-hole.

Our manner of working the purifiers up to this point had been the usual one, *i. e.*, whenever a trace of H_2S was shown at the outlet of the second working purifier, we threw the first (foul) purifier out of action, placing another fresh filled box at the end of the series. The foul material was then turned out, and the purifier again filled with revivified oxide, ready to take its place at the end on the next change. The purifiers about this time (the spring of this year) were beginning to require refilling more frequently, and on testing the material we found it to contain from 40 to 45 per cent. of free sulphur in the dry state.

The system of injecting air into the idle box had only been tried when a paper on "Economy in Oxide Purification," read by Mr. H. L. Rice before the Ohio Gas Light Association on March 26th of this year, and published in the AMERICAN GAS LIGHT JOURNAL shortly afterwards, led to further experiments. The inference drawn from this paper was that a more effective revivification of the foul material *in situ* took place with the air in presence of the purified gas, than in the presence of unpurified gas, and following out this argument we attempted to inject air at the inlet of the second working purifier by means of a steam jet. But the back pressure at this point was too strong, and so we had again to revert to the apparatus for injecting at the inlet of the condensers, and allow the air to travel with the gas; and we find that while the air has little or no effect in the first purifier (*i.e.*, in the presence of foul gas) it revivifies the oxide in the second box.

To follow out this system we had first to see that all purifiers were clean but one, and this one we place as second in the series. The action then was that the first purifier took up all the H_2S in the gas, and the mixture of air and purified gas passing into the second box revivified the material there, and we had the third as a clean box, while the fourth, out of action, was also clean and ready for use. Before the first box is fouled the second shows clean at the outlet, and whenever the first shows foul it has to take a second place, by the center valve being reversed a quarter of a turn, and so on, continuing the turn of the valve backward at each change, and thus always putting the clean purifier in front of the foul one, instead of at the end of the series, as in the old system.

When we began this system in June last our material in the two bottom tiers of each box was the oxide which showed the 40 to 45 per cent. sulphur, while the top tier had equal parts of this material and of fresh oxide. We continued without emptying the boxes from June 23rd to October 12th, and purified 14,404,000 cubic feet of gas, and then, in view of the approaching winter, deemed it advisable to empty and refill all the boxes. Two of the boxes were in splendid condition, one box was a little stiff in the bottom tier, while the fourth, which had been in action as the first purifier during the greater portion of the aforementioned period, was hard all through, especially in the bottom tier, but with it all we never had any trouble from back pressure.

High Speed Chain-Drive in Motor Plants.

By MR. GEORGE HILL, in *Elec. Engineer*.

Some 2 years ago my attention was called to high speed chain driving as a means of transmitting power from electric motors to line shafting, countershafts and individual machines and tools, and I immediately commenced an investigation as to the merits of this form of power transmission. For power transmission its completeness and convenience of application as well as the positive speed ratio obtained make it very desirable, the question of its use depending on the price as well as the durability and efficiency. At the particular time in question I was rebuilding the Vulcanized Rubber Company's works at Morrisville, Pa., with the idea of using motor drives in practically every case, with the exception of the main line shaft. The nature of the work, especially in the buffing departments, required very high speed motors, and it was somewhat of a question whether a chain joint could be found that would stand these speeds without rapid wear taking place, but after obtaining samples from the different manufacturers. the "Silent Chain," manufactured by the Morse Chain Company, of Trumansburg, N. Y., was selected as the one best adapted for the particular service in view.

The main shaft in the old mill was formerly driven by spur gearing direct from the engine, as a positive drive was desirable, but this method of connecting to the line shaft was objectionable in the new mill on account of the noise made by the gears, because we wanted clear alleys on each side of the rubber rolls and finally wished to group all of our engines in one engine room. The new design called for two independent 200 horse power Corliss engines arranged to drive to a jack shaft, and a second drive from the jack shaft to the main line, one engine to be a relay in case of breakdown or need of repairs. To drive through belting, while possible, was hardly practicable. It was estimated that at least 24-foot centers would be required, while according to the chain design these centers could be reduced to as short a distance as permitted by the engine construction. The reduced center distances incident to the use of the chain permitted of reducing the floor space in the engine room some 750 square feet, which amounted to a saving in the cost of this building of $1,000, with the difference in the cost of the chain and belt drive of about $500 in favor of the chain. The high efficiency claimed by the makers, if sustained, would show a continuous saving in power consumption, and this, in connection with the less space required, decided me to use the "Silent Chain."

The drive is from the engine direct to the jack shaft on 7-foot centers, with the necessary sprocket wheels on a similar engine some 10 feet away, so that these chains could be uncoupled and placed on the other sprocket wheels in case of a breakdown of the regular driving engine. The second transmission is from this jack shaft to the line shaft on 14-foot centers, the total distance of the engine from the main shaft being 20 feet. The nature of the work in a rubber mill is one that constantly

brings sudden shocks on the transmission gearing, but notwithstanding this, no link or tooth wear, or perceptible lengthening has taken place in these main driving chains, since the starting up of the mill in October, 1903, and a joint pin removed shows practically no wear on the rocking surfaces. The speeds of these chains are about 1,150 feet per minute, and they have required but little attention in the way of lubrication, and make practically no noise when running.

There are 40 motor drives, operating principally individual tools in connection with the work in the factory, though a number of them are used for blower and pump drives. The cost of the individual drives from the motor was much more than for leather belting, but the "Silent Chain" has a most decided advantage on account of the positive speed ratio obtained, less space required, higher efficiency and greater durability, making it the more desirable transmission to use. Loss of time repairing belts is a considerable item each year that costs in the delivery of an order frequently far more than the chains cost. The efficiency claimed by the makers was practically 99 per cent., and on the large speed ratios used, one could hardly expect to obtain an efficiency of over 94 per cent. by the use of belting. This difference in efficiency between the two methods of transmission would, if the chain were as durable as claimed, save enough in the power cost alone to renew the chain when worn out.

Electric Light and Power in South America.

By Victor M. Arana in *Elec. World.*

Few are aware of the rapid progress made in the introduction of electric power in South America. If we have in mind the many difficulties and obstacles which modern improvements and inventions meet in conservative countries, this gives indeed an eloquent proof of the wonderful adaptability of electric power to all manner of requirements and conditions. The latest electric labor-saving devices and power appliances are now being introduced in regions where the use of mechanical power in any form was hardly known, and where even the time-honored steam engine was a rare luxury.

Ten years ago there was not an electric railway system, few of the capital cities boasted of electric lighting plants, and the use of electricity for industrial purposes was not dreamed of. Now, however, a veritable transformation is taking place in the Southern continent. Every town of some importance wishes to be up-to-date; importers, contractors and engineers have more than they can do introducing and installing electric railway, lighting and power plants.

There have been two foremost causes that have delayed the bringing about of this state of affairs: the unstable condition of governments and the high price of coal. With the first no extensive industries could be established, due to the fear entertained by capitalists and business men lest their interests would serve, now and then, as campaign resources and war funds for the contending factions. The enormous cost of coal, which could be obtained only from English ports, made the use of steam for factories almost prohibitive, and even in very profitable industries other kinds of fuel were used, in spite of their poor quality and the inconveniences consequent to their use.

Now, however, one obstacle has been remedied and the other avoided. The "Big Four" among South American nations, Argentina, Brazil, Peru and Chile, have done away with revolutions and similar political upheavals. Military governments are a thing of the past in those countries; capable and energetic men are at the heads of the governments, and large investments in various industrial enterprises and commercial schemes are the result of the beneficial change. On the other hand, the recent phenomenal success attained in electrical long-distance transmission of power, in this country and Europe, has practically obviated the difficulties due to the lack of coal; for already large industrial plants have been established and more are in project, using water power.

Undoubtedly, the general adoption of electric power in South America is primarily due to the exceptional adaptability of that continent to the generation of hydro-electric power. About three-fourths of South America is composed of deep valleys, high plateaus and chains of mountains. This peculiar configuration of the territory, which is everywhere lined with streams, varying in size from gigantic rivers of the Amazonic type, to shallow 6-month streams, affords innumerable waterfalls, some of which could certainly rival Niagara in volume of water and the Californian mountain streams in abruptness of fall. The Andes Mountains, which cross South America from Panama to Chile, with their branches and highlands surrounded by them, form a mammoth continental reservoir, whose storage capacity and multitudinous outlets are well-nigh beyond ordinary calculation. The facility with which these waterfalls can be harnessed and the growing demand for power in those new communities point to an era of water power developments very similar to the one which took place on the Pacific Coast and those in Southern France and Mexico If to this we add the unusual facilities afforded by governments to industrial enterprises, and the prosperous condition of the majority of those countries, the magnitude of the movement is at once apparent.

South America may be divided into three distinct zones, which differ materially in the extent of their electrical development, and in the kind of business and management of the plants. In the first place, the Atlantic zone, comprising Argentina and Brazil as its most important field, must be considered. In this region electrical industries are in a very advanced state of development. Buenos Aires, the progressive capital of Argentina, which is the largest and most advanced city of the Southern hemisphere, having a population of a million inhabitants, is the most important seat of electrical industries in South America. One may have a very clear idea of the volume of the electrical business in that city when learning that there are 6 large railway, lighting and power companies, supplying electric current.

The power stations are in the outlying districts of the city and current is generated and distributed using voltages ranging between 1,000 and 6,000 volts, which is stepped down for use by means of transformers placed in sub-stations and cellars. The cost of power varies all the way from 2 to 15 cents per kilowatt hour, depending on the quantity, voltage and location of the consumer. The generating stations use, to a great extent, American machinery and supplies, and the street car lines, exclusively, American motors and other railway apparatus. Although the promotors and capitalists are from different countries, the control and management are mostly under Argentines or native Europeans who have become naturalized citizens.

One peculiarity of the electric street car systems in Buenos Aires is that they are seldom confronted by what is known as "rush hours." Street cars have at all hours of the day a large and uniform traffic. This is due to two causes: The city of Buenos Aires has its business and residential districts side by side; whatever be the direction and extent of the city's growth, both go together. In the second place, the Southern metropolis is one of the best paved and most carefully kept cities in the world. There are a number of Alamedas and Avenidas (Boulevards and Avenues) which radiate from the center to the outskirts, on which no street cars or trucking is allowed, and along which thousands of automobiles, cabs and bicycles are constantly conveying pleasure seekers and business people every day in the year.

Brazil is another South American country where electric industries have progressed rapidly. The tendency, especially in Rio de Janeiro, is toward the consolidation of the most important plants. Not long ago it was learned that a syndicate composed of Canadian capitalists had effected a successful movement in that direction by taking control of all the street car and lighting plants of the city of Rio de Janeiro. The name of the corporation is the Rio de Janeiro Tramway and Light Company, and it is capitalized at $50,000,000. Rio de Janeiro, like Buenos Aires, has a very extensive system of trolley lines and lately has also taken up the building of electric suburban roads. By a decree dated April 5, 1904, the government of Brazil approved the basis of a contract presented by the Minister of Industries, Commnnications and Public Works, for the construction of an electric railway between Rio de Janeiro and the city of Petropolis, a distance of nearly 100 miles. This is a very important move, as it means an advanced step in the introduction of electric railways in the place of steam railroads.

A Brazilian state of growing importance and whose riches have attracted large numbers of German immigrants, is Sao Paulo. Here electric industries are well advanced. The Sao Paulo Light and Power Company lately awarded an important contract for further equipment to be installed in the hydro-electric plant on the river Tiete, located over 20 miles distant from the city of Sao Paulo. The additional machinery will include a 2,500-kw generator to be direct connected to a turbine of 4,000-horse power capacity. When the extension is completed the capacity of this plant will reach the 10,000-kw mark. The Sao Paulo plant was the first water power long distance plant installed in Brazil, and the perfect satisfaction it has afforded will no doubt give impetus to the development of hydro-electric plants in a region very well adapted to that industry.

The second zone and the one which promises to become the most important to promoters and manufacturers of electrical machinery, in the near future, is the Pacific side of South America. Peru and Chile have within their borders about one-half the Andes Mountains. Their terri-

tories are crossed by a great number of rivers of torrential character, which are situated near large centers of population, mining properties and other prospective markets for electric power.

Mining industries have received a great impetus due to the facilities for obtaining power from hydro-electric transmission plants. There are a great many mines possessing their own water power plants, and whose machinery, transportation and lighting are entirely done by electric power. The most important instance of this kind is furnished by the Cerro de Pasco Mining Company. This is a North American corporation, which some time ago purchased valuable copper and silver mining claims in Cerro de Pasco, Peru. These mines are located about 200 miles east of Lima and the Pacific Ocean, to which they are connected by a steam road, famous the world over as the highest and most difficult bit of railroading ever constructed. The mining concern has already begun the building of an 8,000-kw plant which will furnish power to be used in traction, lighting in addition to driving the machinery of the establishment.

Alongside the above mentioned road is situated what is believed to be the highest voltage long distance electric transmisson in actual operation in South America. This is the plant of the Empress Eléctrica de Santa Rosa (Santa Rosa Electric Corporation), whose distance of transmission is nearly 30 miles and the voltage used 33,500. This transmission plant is actually operating with a capacity of 4,500-horse power, which energy is transmitted to Lima, where it is stepped down to 2,300 volts for local distribution. This plant is the latest development in the extension of the Santa Rosa Company. This concern originally built and operated a steam plant in Lima, using as fuel petroleum from Peruvian oil fields. Then, on the river Rimac, which passes through Lima, a low head dam was built to furnish power to turbines and generators; this was the first extension to the original plant. The above mentioned 30-mile transmission plant, which takes power from the same river, is the second addition built by the company. Still this could not be called the last extension in this direction, as the river affords very good heads and perhaps more water from more distant places in its course. The building of more extensions higher and farther up the river would present a curious feeding system of hydro-electric power into an electric circuit, which would be exactly the opposite of a long railway feeder system, and where the water wheel plants would perform a similar role to that performed by rotary sub-stations.

Lima, which is one of the most important cities of the Southern Continent, is now lighted throughout by electric power, and in many manufacturing plants the machinery is driven by electric motors. A number of cotton and wool weaving plants have recently been equipped with motor driven spindles and looms; there are also cigarette, soap, cracker, match and other factories which use electric motors to drive their machinery.

Two syndicates were recently formed in Lima for the construction and operation of trolley suburban car lines. One of them is to connect Lima with Callao, its seaport (already connected to the capital by 2 steam roads), and the other with a number of seashore resorts. The government gave the 2 syndicates a privilege for 66 years. The 2 companies are to be free of taxes and are to import free of duty for the term of 2 years all material for their own use. At the end of 66 years the cars, rolling stock and all material become the property of the government free of cost. Both the electric railway companies have purchased from North American manufacturers machinery, supplies and other material to equip the lines. Both these lines which are now in actual operation use power from the Santa Rosa Company; besides the main power station in Lima there are 2 rotary sub-stations to furnish power along the line.

These are only a few of the latest developments in the western coast of South America. Chile and Bolivia are also becoming interested in hydro-electric developments. There are a number of mining companies in Chile availing themselves of the rapid course of Andean streams for generating electric current for driving their machinery, lighting their establishments and sometimes for traction. Ecuador has lately joined the general movement, too; Guayaquil, Quito and other important centers have already modern central station lighting plants, and the electric current will soon be used in other industries.

The third zone, which is composed of the republics of Colombia and Venezuela and the Guianas, is undoubtedly the best known South American market among American exporters and promoters, because of its proximity to this country. One must acknowledge also that nearly all the electrical development in that region is due to American or Americanized business men. Herein lies the most important difference among the three zones: The Atlantic zone is the least known to American capitalists and exporters, and while there are many natives interested in the electric enterprises, the bulk of the business is controlled by Europeans or Europeans who have become naturalized. In the Pacific zone, however, most of, if not all, the electric concerns are financed and managed by natives. On the other hand, the northern or Caribbean zone is to a great extent financed and controlled by Americans. There is, however, one teudency throughout South America, which is to abandon European manufacturers and exporters in favor of Americans, as the people are made aware of the gigantic strides made by this country in electrical science and industry.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Nov. 10th, 1904.

The Education and Position of Gas Engineers—The Gas Exhibition—More About Naphthaline.

We may well be proud of our Junior Gas Associations, several of which have lately been established throughout the country. They are tackling home truths with a directness and point frequently wanting in the Senior Associations, and they do not hesitate to call a spade a spade. A great deal has been written and said about the education of gas engineers, but it remained for Mr. R. H. Brown, of the London and Southern District Junior Gas Association, to sum up the position. He accomplished this task in a very competent manner in the course of a paper submitted at a recent meeting. Commencing by quoting examples of thoroughly trained and competent men who were not successful in securing appointments, he goes on to show that the manager of a medium sized gas works need not necessarily be a highly trained engineer. But the pith of his remarks is to be found in the paragraphs dealing with the attractions and emoluments. We hear a great deal nowadays of men who devote their abilities to public duty, but it is scarcely to be expected that young men will give about 10 of the best years of their lives to the work of obtaining a thorough knowledge of engineering, chemistry, mathematics, etc., with no better prospect than a more or less medium position, continuous labor, and a bare living salary. To quote Mr. Brown: "We are not in business for our health, but to acquire a competence and a living, and I believe that greater rewards are secured in a good many other fields than in the gas industry." This is plain, wholesome speaking. Young men have been urged over and over again to educate themselves, to advance with the times, and so on, but it is no use hoodwinking the fact, which is palpably evident from the advertisement columns of our gas periodicals, that salaries do not advance. The gas works manager of to-day is expected to know all about regenerator furnaces, inclined retorts, water gas, sulphate manufacture, slot meters and free installations, maintenance of incandescent burners, and many other details that were unknown in the earlier days, when his predecessor had less to do and was better paid for doing it. In fact one might go further than Mr. Brown and question whether first-class ability is not an actual hindrance. Many small and medium size undertakings are controlled by boards of directors who can see very little further ahead than the dividend, and who are inclined to regard the first-class man as a faddist who would want to improve and reconstruct the plant from one end to the other. But however that may be, Mr. Brown is quite right when he says that the coming generation are not going to educate themselves for the wages of a foreman. There are promising openings in other directions in which the skill and business ability required to run a gas undertaking can be applied to much better advantage, and so long as this is the case, the best class of men will not enter the ranks of the gas profession and the consequences, as regards the stability and advancement of the industry, will be more evident in 20 years time than they are at present.

The prospects of the exhibition at Earls Court to which I referred last month are decidedly promising and there is every reason to expect that it will be worthy of the important industry represented by it. The committee claim that it is already an assured success supported by the entire industry. What is more to the point however is the statement that nearly 200 exhibitors have taken space, including most of the leading houses in the trade, and that over 50 well known firms will show their latest specialties and many machines at work. There will be a series of completely furnished rooms illustrating lighting, decoration, etc., a workman's college with prepayment meter and free installation, a modern shop, and lectures on heating, cooking and lighting daily, also open quick cookery competitions daily, for substantial prizes. The exhibits are classified under eight heads, including lighting, cook-

ing, heating, motive power, applications to industrial purposes, science in relation to the gas industry, residual products of gas manufacture, engineering in connection with gas manufacture, distribution and measurement, and miscellaneous. The exhibition is to be opened by the Lord Mayor of London on the 19th inst., and he will be attended by a guard of honor composed of men in the employment of gas undertakings who have seen active military or naval service, and it will remain open for 4 weeks. Assistance and support have been received not only from home but from foreign gas undertakings and associations of gas engineers and arrangements for informal visits by members of such associations are in progress. In several respects the exhibition is a distinct novelty as compared with previous efforts in this direction, especially as regards the introduction of the recreative and entertainment element. It is a bold and original endeavor to run an instructive exhibition on popular lines and whatever the result may be the experience gained cannot fail to be valuable, and the committee deserve the thanks of the profession for their well organized attempt to render their exhibition really attractive to the public. While other previous exhibitions have erred in the direction of preaching over the people's heads, this one aims at meeting the public on their own ground.

One wonders sometimes why there is such a thing as disease in the world. When we take up the advertising sheets of any widely circulated popular magazine we are confronted with a great deal of medical information, some of which is not in the best possible taste. There are illustrations of a not specially artistic or pleasing character, and personal inquiries that are calculated to send the reader in an agony of fear into the office of some wonderful remedy company or other. From this curious assemblage of testimonials from grateful patients, short medical lectures and price lists, it is easy to gather at least half a dozen remedies that should, assuming their virtues to be correctly set forth, be a sure preventative of any and every disease. And yet the general experience is that maladies increase in frequency and number, not only collectively as regards the length of the list, but individually as regards the number of syllables and letters in each word. This lengthy preamble is necessary to express the ideas suggested by the discussion on naphthaline which has lately been appearing week by week in the columns of the *Journal of Gas Lighting* and which was originated by the description of Colson's process to which I alluded last month. The wonder is that anyone should be worried with naphthaline at all or that any associations or individuals should trouble to investigate the matter or to acquire further knowledge about it. Because it appears that at least half a dozen different inventors have solved the problem long ago. Some of these processes are of a very simple nature, easily applied to any gas plant, and not expensive. Why is it that they have not secured a general application? They do not appear to flourish outside the fostering care of their originators. Can it be that the remedy is worse than the disease, as is the case with some of the advertised medicines?

My own experience goes to show that naphthaline is largely a question of temperature, and that if the gas is delivered at the station meter at the temperature of the atmosphere, or not more than a degree or so above, a long step towards the prevention of trouble in the district is effected. In three or four instances I have known an enlargement of the purifying plant to be practically a complete cure. In one small country works there was frequent trouble at the holder inlet and outlet, and they had to be cleared every month or so. At that time a set of 3 purifiers, each 6 feet square, was used. An opportunity offered for securing a second-hand set of four 12-foot boxes. Since these were put into operation—about 7 years ago—the holder connections have been perfectly clean. In another case the purifying plant consisted of four 12-foot boxes, and there was frequent trouble between the outlet of the purifiers and the holders. The meter connections would sometimes be completely choked. Continued increase of water rendered it advisable to add two 20-foot boxes, and since these were fixed—some 20 years ago—the connections to holders have remained clear. Take a third case. Owing to alterations in the purifying plant it was necessary to run through the summer months with only 2 boxes. Very little difficulty had occurred in the works or district before, but directly the temporary arrangement was started, naphthaline troubles became disagreeably evident both at the holder and in the district. Directly the purifying plant was supplemented by 2 new and larger boxes, the difficulty diminished and disappeared. In many cases the trouble can be practically cured, and in all cases it can be obviated by careful attention to the indications of the thermometer at various points from the outlet of the retort to the holder. The make of gas should be steadily and gradually reduced to atmospheric temperature without a cold bath or other sudden chill and should not be subjected to any fluctuations. In the interesting paper contributed to the Michigan Association by Messrs. White and Ball, which should be carefully perused by every gas engineer in America, and out of it, it will be noticed that if the saturating point of naphthaline at 50° F. is taken as = 1 that at 60° is approximately 2, at 70° 3½, at 80° 6, and at 90° 10.

So if the gas engineer can spare time from the cultivation of a friendly feeling with the prospective user of a slot meter a cooker and two pendants (all to be supplied by the company) which appears to be his chief occupation at the present time, to attend to such humdrum matters as the temperatures and other working details at the works, he may secure practical immunity from naphthaline trouble without having the responsibility of running another process thrown upon his already overloaded shoulders.

Another point. Naphthaline resembles the famous sulphur compounds in being present only in the proportion of a few grains per 100 cubic feet. When we read of reducing this so-called impurity from 10 grains to 2 grains per 100 cubic feet—say from one part in 2,500 to one part in 12,500—it is evident that such close working cannot be secured by any simple, easy, take-care-of-itself sort of process, but that it will need considerable skill and watchfulness. The simplest means known for taking quantitative tests are of a tedious character involving considerable expenditure of time. So altogether it is not surprising that most people prefer to bear the ills they have, until they become so pronounced as to be unbearable, rather than to resort to remedies that may, and probably will, bring other troubles in their wake.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. F. H. Shelton has been engaged by Messrs. J. G. White & Company, of New York, as Consulting Engineer and Manager of their gas department, in the matter of the Wilkes-Barre (Pa.) Gas and Electric Company, which corporation, according to prior notice in the Journal, had taken over for amalgamation the gas and electric lighting properties of Wilkes-Barre.

Mr. James Salter has been formally appointed Superintendent of Works for the Meridian (Miss.) Gas Light Company. Mr. H. L. McKie is no longer connected with the Company in any capacity.

Mr. Arthur R. Cruse, President of the Cruse-Kemper Company, of Philadelphia, writing under date of the 17th inst., says that in addition to some very gratifying orders recently booked for structural iron, the Company was favored with the following contracts in the gas works line: A 100,000 cubic foot, telescopic gasholder, in steel tank, for Bristol, Conn.; a 30,000 cubic foot, single section gasholder, in steel tank, for the same point, and 2 oil tanks, 8 feet by 33 feet. A 50,000 cubic foot, single lift gasholder, in steel tank, for Rochester, N. H.; and a 200,000 cubic foot, telescopic gasholder, in steel tank, for Quincy, Mass.

A brace of speculators from Corona, Cal., are endeavoring to secure a franchise for the construction and operation of a gas plant in Anaheim, Cal.

The leaders in the contest for the right to supply natural gas in Leavenworth, Kas., at the moment seem to be the syndicate which Mr. Douglas Burnett claims as his own.

At the annual meeting of the Watertown (N. Y.) Gas Company the officers elected were: Directors, A. R. Flower, A. C. Beach, John B. Taylor, George H. Babcock, Orville E. Hungerford, S. L. George and F. B. Pitcher; President, George H. Babcock; Vice-President, O. E. Hungerford; Treasurer, S. L. George; Secretary, F. B. Pitcher. The proposition to increase the capital stock from $100,000 to $500,000 was indorsed.

The official tests of the illuminating value of the gas supplied by the Rochester (N. Y.) Railway and Light Company show that the Company is maintaining its contract by more than 1½ candles.

The leading editorial in the "Purifier" for last October, which is published monthly in San Francisco, Cal., under the auspices of the Pacific Coast Gas Association, was as follows:

"It has become a habit, and a good one, for large firms and corporations to gather together their executive men, at frequent intervals, around the social board, for the discussion of matters appertaining to their particular duties, and particularly for the purpose of bringing the

men together for better acquaintance and better toning up of themselves, which always redounds to the benefit of the concern for which they are working.

"The California Gas and Electric Corporation, on October 27th, tendered its division superintendents and local managers a dinner, which is the beginning of similar gatherings. At that dinner, in response to a toast, Mr. F. G. Baum, Transmission Engineer, gave voice to the following sentiments, and, as they are particularly applicable to every man who is seeking to better himself in the world, we herewith publish them for your careful reading. They are worthy of being engrossed, framed and placed in every office and workshop, that employer and employee may benefit therefrom:

"Always look to your organization and continually try to improve it. History teaches us that there are in every organization forces tending to wreck it; that the tendency of every organization is toward disruption, or degeneracy, because it is easier to go down hill than up. It is for you to put enough energy into your organization to make for continuous improvement. Tend to your own business and make every man tend to his. Be as quick to recognize a good man as a good device, and choose the best. Force the laggard, but do not shove the man going at top speed; you will break his stride, he may falter and fail. Be careful not to make mistakes, but when you do make one be big enough to acknowledge it. Keep your work and do it. Only the competent man can win the respect of the man under him. For success, it is as important that you have the respect of those under you, as well as those over you. Be thorough. Do that which you have to do with all your might. We judge a man's ability to do a big task by giving him a little one. Don't hold your job, make your job hold you. Like your work; if you don't like it, get out. Keep busy, think, read, be up to date, be effective, be a success. There is a place for you."

THE proprietors of the Cambridge (Mass.) Gas Light Company have petitioned the Board of Gas and Electric Light Commissioners for the right to make a sensible increase in the capital stock, the proceeds of the sale of which are to go towards plant betterment, redeeming floating debt, and the like.

AT the annual meeting of the Suffern (N. Y.) Gas Company, the officers chosen were: President, Edward Oakes; Vice-President, S. N. Pennington; Secretary, D. W. La Fetra.

MR. J. W. ABBOTT, Superintendent of the Ottawa (Can.) Gas Company, has completely recovered from the accident that his friends feared would at the outset result fatally.

THE proprietors of the Atlantic City (N. J.) Gas and Water Company have reduced the net selling rate to 90 cents per 1,000 cubic feet.

MR. F. A. STRATTON, of Mount Vernon, N. Y., has been elected President of the Westchester (N. Y.) Lighting Company. Good luck to him.

WE regret to report the death of Mr. Frank E. Colbert, whose services as cashier to the Detroit City Gas Company were of the efficient and faithful sort. He died at the home of his parents, Trumbull avenue, Detroit, the night of the 12th inst. He was in his 31st year.

AT the annual meeting of the Brooklyn (N. Y.) Union Gas Company no change was made in the executive management.

THE terms agreed upon whereunder the local authorities are to take over the properties of the St. Thomas (Can.) Gas Company, have been reached by the board of arbitration. The price is $196,000 or $8,000 more than the Company specified as its regular naming price.

THE Board of Gas and Electric Light Commissioners, at a conference held some days ago between the Commission and the city authorities of Boston, over the petition of Mayor Collins for a readjustment of the gas rates in that city, named the 22d and 30th insts., as proper dates for the taking of testimony.

WE understand that the plants of the Jefferson City (Mo.) Electric Light and Gas Company have been purchased by a syndicate of Chicago capitalists.

AT the annual meeting of the Buffalo (N. Y.) Gas Company, the Directors elected were: A. C. Humphreys, Robert C. Pruyn, J. E. Addicks, Robt. C. Pruyn, F. D. Locke, H. Seligman, H. L. Clark, Stephen Peabody, George W. Pepper, Pascal P. Pratt, W. S. Riselay, E. M. Mills and L. J. Stickle.

THE residents of Belding, Mich., are said to be clamoring for a gas plant.

THE Denver Gas and Electric Company is extending its main system to the outlying district known as Highlands.

IN an interview between a reporter of the Syracuse (N. Y.) *Telegram* and Mr. John J. Cummins, Manager of the Syracuse Lighting Company, the latter said: "On and after December 1st the price for illuminating gas will be $1 per 1,000 cubic feet, net. In preparation for the unusual consumption of gas which it is expected will follow the reduction in price many miles of mains have been laid in the outskirts of the city. Two new holders, with a combined capacity of 1,000,000 cubic feet, have been erected and are now in operation. Manufacturing apparatus to increase the daily maximum capacity of the works to 3,000,000 cubic feet have been installed. Old mains that proved insufficient in their carrying capacity have been taken out and larger ones laid. The plant is now in splendid condition, with generating and distributing capacity to care for the most excessive demands made upon it." When asked his opinion of the effect dollar gas would have on the real estate market, Mr. Cummins said: "The extension of gas mains in the suburbs has enabled the owners of property to dispose of the same at advantageous prices. Much of the activity in the real estate market is due to the broadminded policy of this Company in providing its conveniences for those living at a distance from the center of the city. Suburban residents have shown their appreciation of the kindness of the Company by promptly applying for the service and generously using the same. In this connection it can be said without boasting that the Syracuse Lighting Company has been an important element in promoting the growth of the city towards the outskirts. By reason of its liberal policy in extensions of gas mains and electric lines it has brought into the homes of those living at remote distances all the comforts of a downtown dweller. Moreover, the introduction of gas and electricity into these sections of the city has encouraged real estate dealers to freely invest their money in building homes and has enabled them to dispose of those homes at profitable prices. The average citizen has become accustomed to the use of gas for cooking and all other family purposes to such an extent that he does not care to rent or buy a home not fitted up with those conveniences. It therefore has become one of the first requirements in renting or buying. This Company, desiring to keep not only abreast but a little ahead of the times, has anticipated this universal request by reaching out as far as possible with its service. With a reduction on December 1st to $1, gas will be the very cheapest illuminant that can be used. It will cost much less than oil, while being absolutely devoid of the danger there always is in using the latter."

MR. FRED. N. TATE, whose management of the New London (Conn.) Gas and Electric Company was all that its owners could desire, has accepted the position of Manager of the Dayton (O.) Gas and Electric Company. Of course he improves his placing. His successor at New London is Mr. A. J. Campbell, who is by no means a "new man" to the residents of New London. The changes will be accomplished facts in about a fortnight.

"WOOL OF LEAD" may very likely sound strange to the ears of most gas men, but a German inventor has obtained a patent on the manufacture of lead shavings which are thus designated. Wool of lead is used for making the joints of street mains, instead of the molten article. Its advantages as said are that a lead joint may thus be made during stormy weather, when the melting pot and ladle could not be used; or joints may be made in wet ground when often the ordinary pouring of a joint is impossible. The joints thus made are described as not only tight, but actually stronger and requiring less depth of lead than the poured joint.

THE Directors of the Madison County Gas and Electric Company, of Oneida, N. Y., have named the following executive management: President, C. Wellington Koiner, Oneida; Vice-President, Isaac C. Green, Providence, R. I.; Treasurer, Frank D. Pavey, N. Y.

MR. THOMAS FERRIS, of Milwaukee, has been appointed Manager of the Electric Light, Heat and Power Company, of Osage, Ia. He is a capable man, and numbers of gas men wish him good luck in his new field.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, NOVEMBER 28, 1904.

The Market for Gas Securities.

The Thanksgiving change in investment securities' prices seems to reflect the belief that oysters will soon be as cheap as turkeys were. Not that Oyster Bay may be the less silent, but that Long Islanders might like more turkey at Oyster Bay rates. However, the acolytes know that Consolidated closed at 215 to 215¼ ex div., to-day (Friday), so the proportion of shrinkage in face value to the return in dividend has been discounted by the religious. Gas bonds, meanwhile, are strong.

Brooklyn Union is figured at 218 to 222, ex-div. of 2½ per cent. The owners of the Company are looking at Brady & Co. like the dog on the ground while the cat is on the fence. There is no particular change shown in any of the other staple gas securities, which are all in good demand, especially Peoples, of Chicago, and Baltimore Consolidated. The fact that "the third pooled interest" in the latter has elected to take "80 or more" for its poolings seems not to have brought "many bites."

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

NOVEMBER 28.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	215	215¼
Central Union, Bonds, 5's.	3,000,000	1,000	108½	110
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Mutual	2,500,000	100	290	310
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	111	113
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	104	106
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106½	108½
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	999,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	218	222
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	5¾
" " Bonds, 5's	5,250,000	1,000	66	68½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	10	108½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¾	89½
Preferred	3,096,500	100	107½	109
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	82¾	83¼
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Consolidated G. & E. Co.'s. Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99¼	100
Detroit Gas Co., 5's	361,000	1,000	75	75½
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	99	101
" Bonds, 5's	10,500,000	..	106½	107½
Indianapolis	2,000,000	..	70	75
" Bonds, 6's	2,650,000	..	106½	108
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,222,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	90	.
Bonds	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	58	58
Bonds, 6's	4,600,000	..	105	105¼
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103½	103¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87¾	90
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	94	98
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	.
Washington, D. C	2,500,000	20	290½	300
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	220	..

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DIVIDEND NOTICE.

OFFICE OF THE AMERICAN GAS COMPANY,
222 S. THIRD ST., Philadelphia, Pa., Nov 16, 1904.

The Board of Directors of The American Gas Company has this day declared a semi-annual dividend of 3 per cent., or $3 per share, on the capital stock of the Company, payable on and after Dec. 1, 1904. Checks will be mailed.

1538-1 WALTER GODLEY, Treasurer.

POSITION WANTED

As Manager or Superintendent,

By a man who has had 15 years' experience in the management of a gas and electric plant, is thoroughly acquainted with all details of the business, and can show results. Can furnish references. Address, "FLINT."

1534-5 Care this Journal.

Position Wanted

In By-Product Coke Oven Plant,

By a young man having 6 years' experience in the operation and management of by-product ovens. Technical education, competent and trustworthy.

1537-2 Address, "BY-PRODUCT," care this Journal.

WANTED,

EXPERIENCED GAS MAKER,

To operate Lowe improved set of gas apparatus. Address,

THE SARATOGA GAS, ELECTRIC LIGHT AND POWER CO.,

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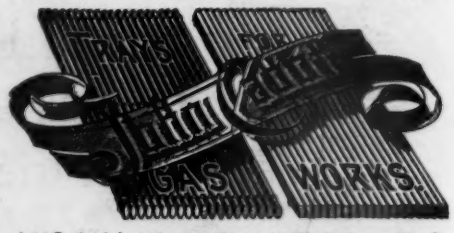

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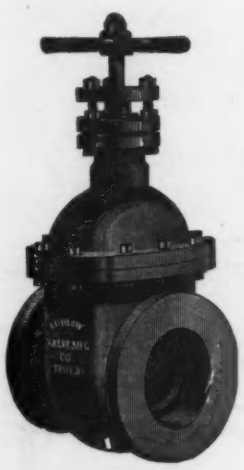

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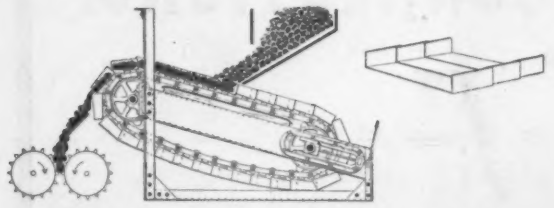

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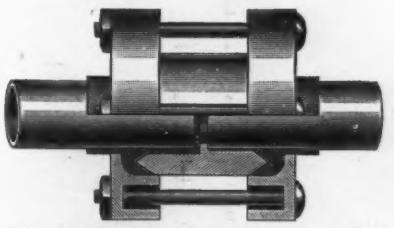

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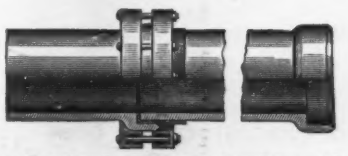

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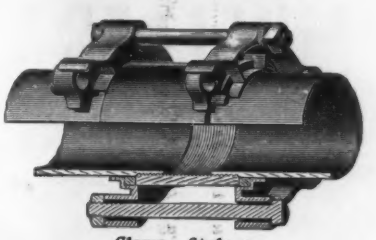

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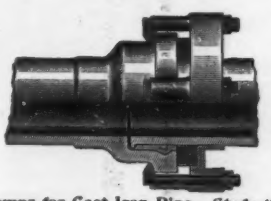

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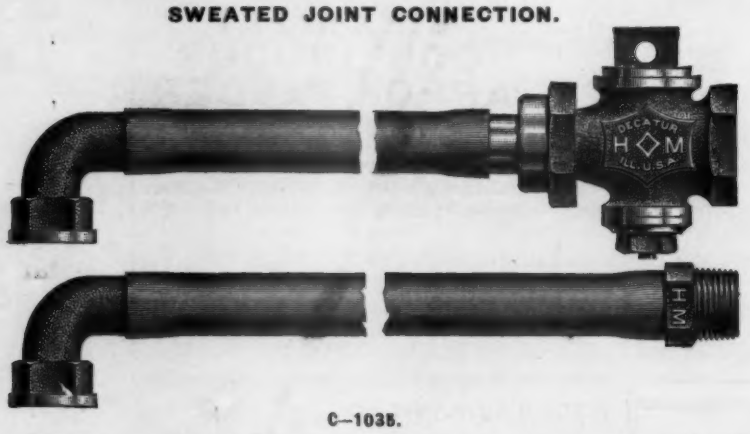

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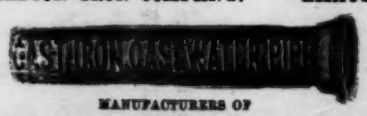

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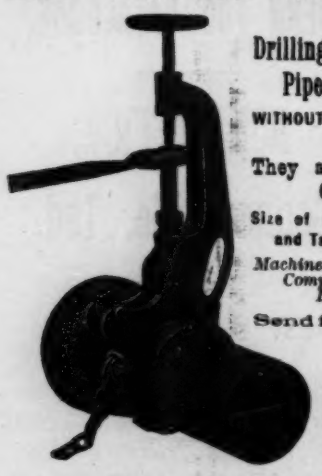

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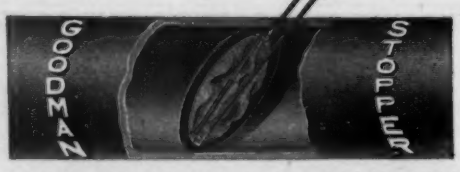
For Shutting Off Gas in Mains Temporarily during alterations and repairs. : : : :

Any size gas main can be shut off in 30 seconds. : : :



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GRATE BARS

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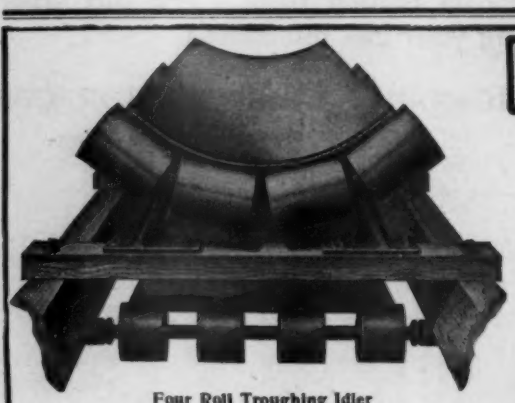
STATIONARY, SHAKING, DUMPING.

BARS FOR HAZELTON BOILERS.



Four Roll Troughing Idler
FOR WIDE BELTS.
The positions of the rolls conform to a natural and uniform curve of the belt.

BELT CONVEYORS

EQUIPPED WITH

BALL BEARING ROLLS

Possess greater efficiency, consume less power, and the belts last much longer than when any other type of roll is employed.

Permit us to tell you why and to submit plans and estimates.

The Link-Belt Machinery Co.
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ESTABLISHED 1836. INCORPORATED 1863.

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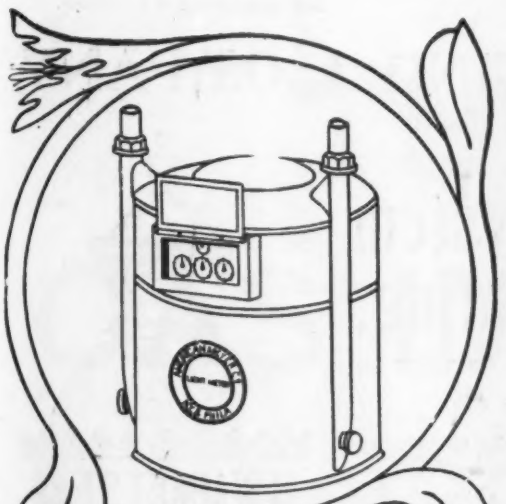
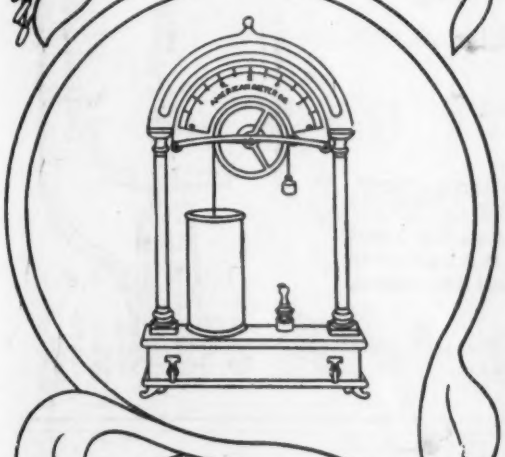
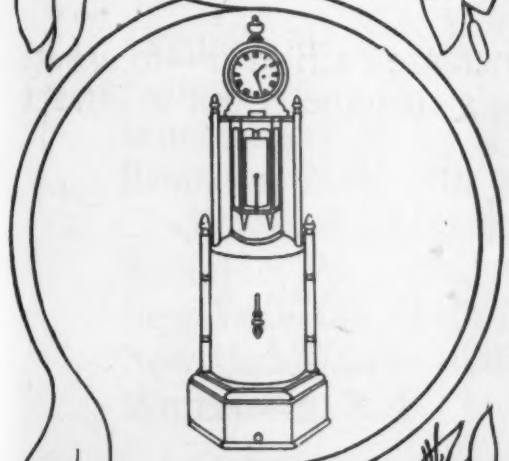


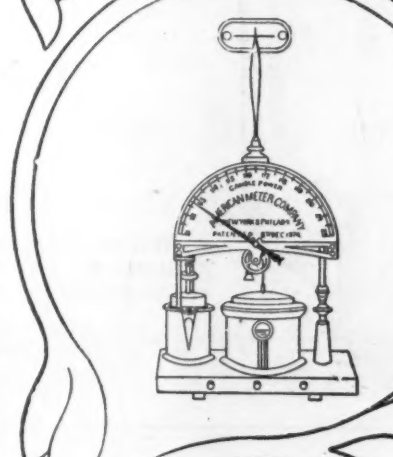


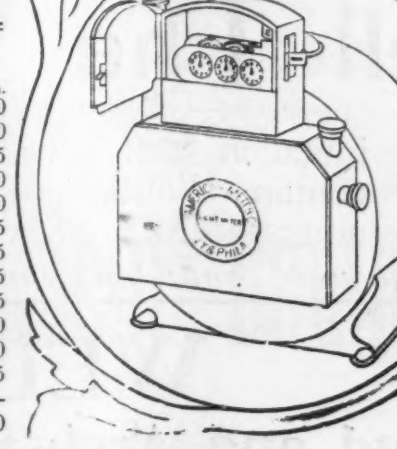


PUBLIC LIGHTING TABLE.

DECEMBER, 1904.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Thu.	1	5.10 PM	2.40 AM	4.20	6.10
Fri.	2	5.10	3.50	4.20	6.10
Sat.	3	5.10	6.00	4.20	6.15
Sun.	4	5.00	6.10	4.20	6.15
Mon.	5	5.00	6.10	4.20	6.15
Tue.	6	5.00 NM	6.10	4.20	6.15
Wed.	7	5.00	6.10	4.20	6.15
Thu.	8	5.00	6.10	4.20	6.15
Fri.	9	5.00	6.10	4.20	6.15
Sat.	10	5.00	6.10	4.20	6.20
Sun.	11	8.10	6.10	4.20	6.20
Mon.	12	9.10	6.10	4.20	6.20
Tue.	13	10.10	6.10	4.20	6.20
Wed.	14	11.00 FQ	6.10	4.20	6.20
Thu.	15	12.00	6.10	4.20	6.20
Fri.	16	12.50 AM	6.10	4.20	6.20
Sat.	17	1.50	6.10	4.20	6.20
Sun	18	2.50	6.20	4.20	6.20
Mon.	19	3.50	6.20	4.20	6.20
Tue.	20	4.50	6.20	4.20	6.20
Wed.	21	No L.	No L.	4.20	6.20
Thu.	22	No L. FM	No L.	4.20	6.20
Fri.	23	No L.	No L.	4.20	6.20
Sat.	24	5.10 PM	8.00 PM	4.20	6.25
Sun.	25	5.10	9.10	4.20	6.25
Mon.	26	5.10	10.20	4.20	6.25
Tue.	27	5.10	11.20	4.20	6.25
Wed.	28	5.10	12.30 AM	4.20	6.25
Thu.	29	5.10 LQ	1.40	4.20	6.25
Fri.	30	5.10	2.50	4.20	6.25
Sat.	31	5.10	4.00	4.20	6.25





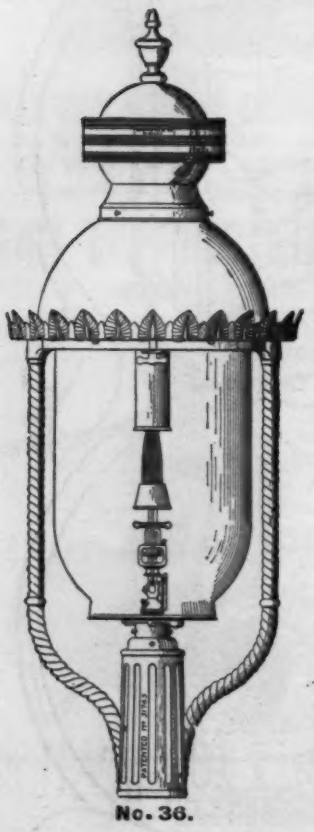
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00

NEW YORK, 97 Liberty Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street.
BOSTON, 814 Beacon Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

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IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple-

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Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 31st, 1904, has been Awarded Contracts in the Following Places for

Standard Double-Superheater Lowe Water Gas Apparatus.

Augusta, Me.	Tampa, Fla. (3d contract).
Bangor, Pa.	Westchester, N. Y. (3d contract).
Woonsocket, R. I. (2d contract).	Bridgeport, Conn. (2d contract).
Brooklyn, N. Y. (4th contract).	St. Paul, Minn. (2d contract).
Cincinnati, O. (2d contract).	Harrisburg, Pa.
Scranton, Pa. (3d contract).	Pelham, N. Y.
New York City (14th contract).	Reading, Pa.
New Haven Conn. (2d contract).	Springfield, Mass. (2d contract).
Watertown, N. Y.	Lynn, Mass. (5th contract).

TOTAL SETS, 1904, ... 35
TOTAL DAILY CAPACITY, 1904, . . 50,400,000 cubic feet.
TOTAL SETS TO DATE, ... 543
TOTAL DAILY CAPACITY, . . . 413,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

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Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

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PATENTS APPLIED FOR.

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Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

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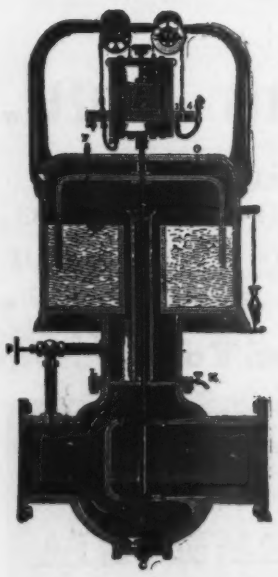

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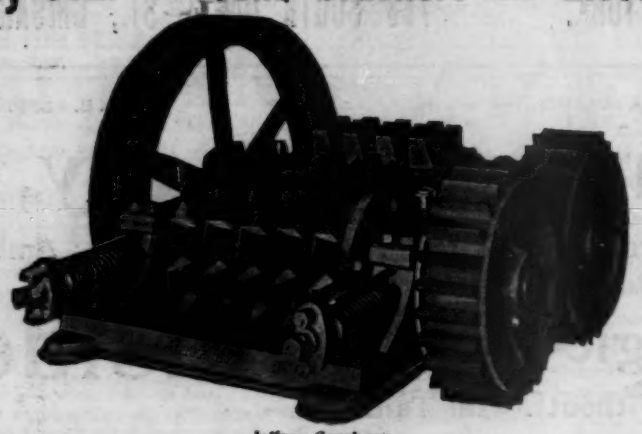

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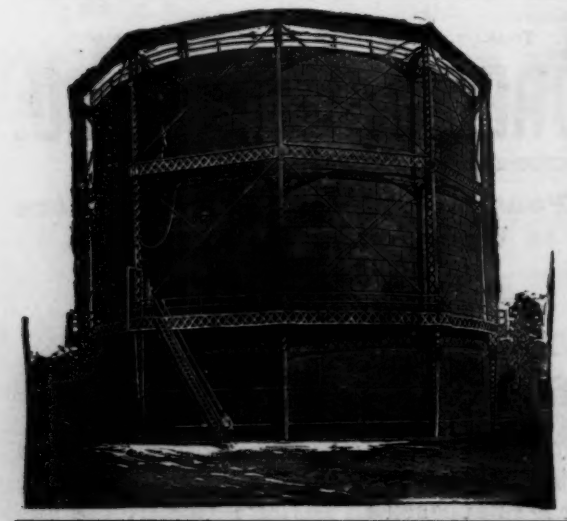

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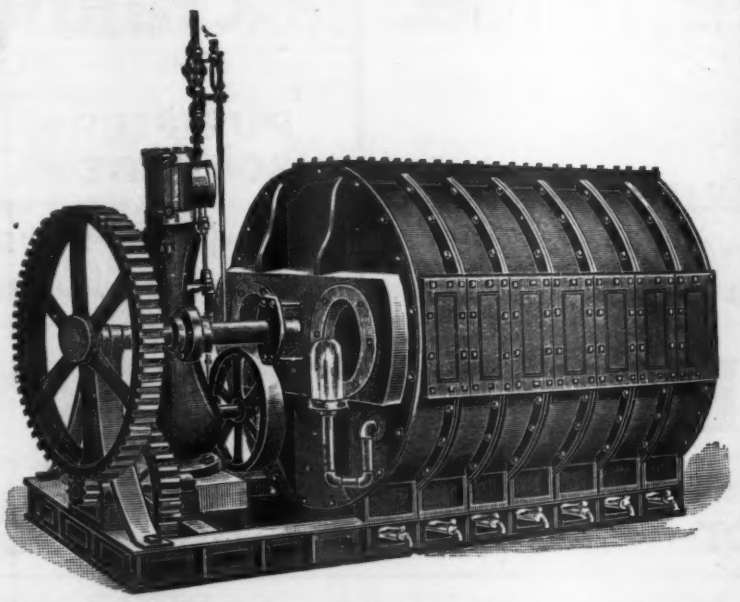

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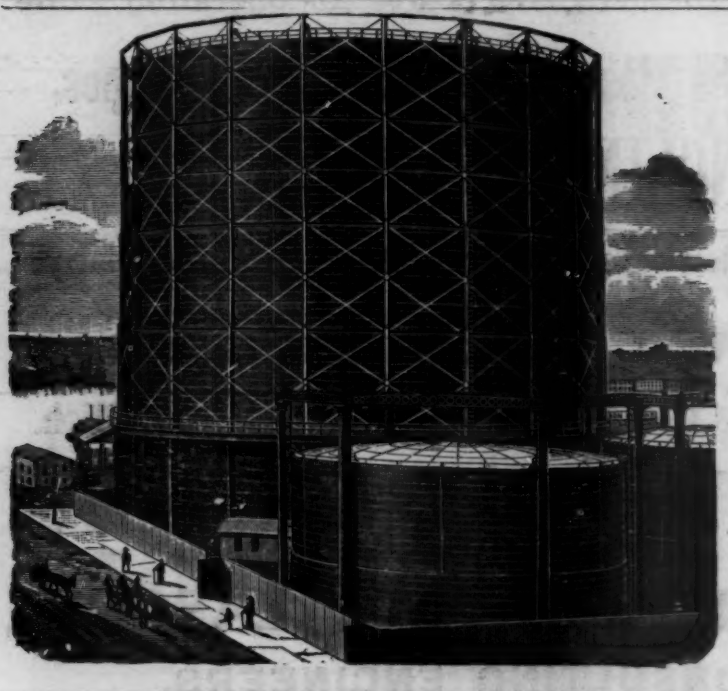

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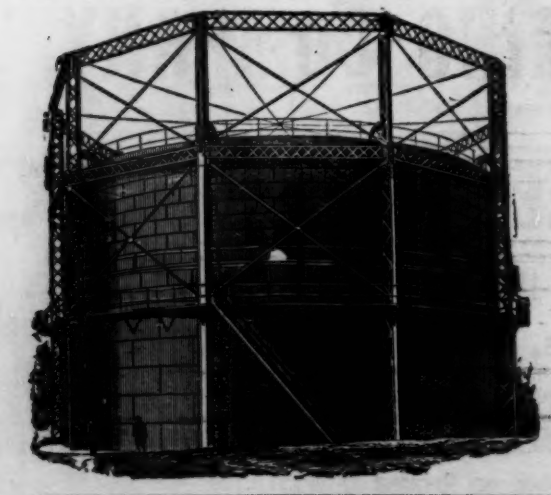

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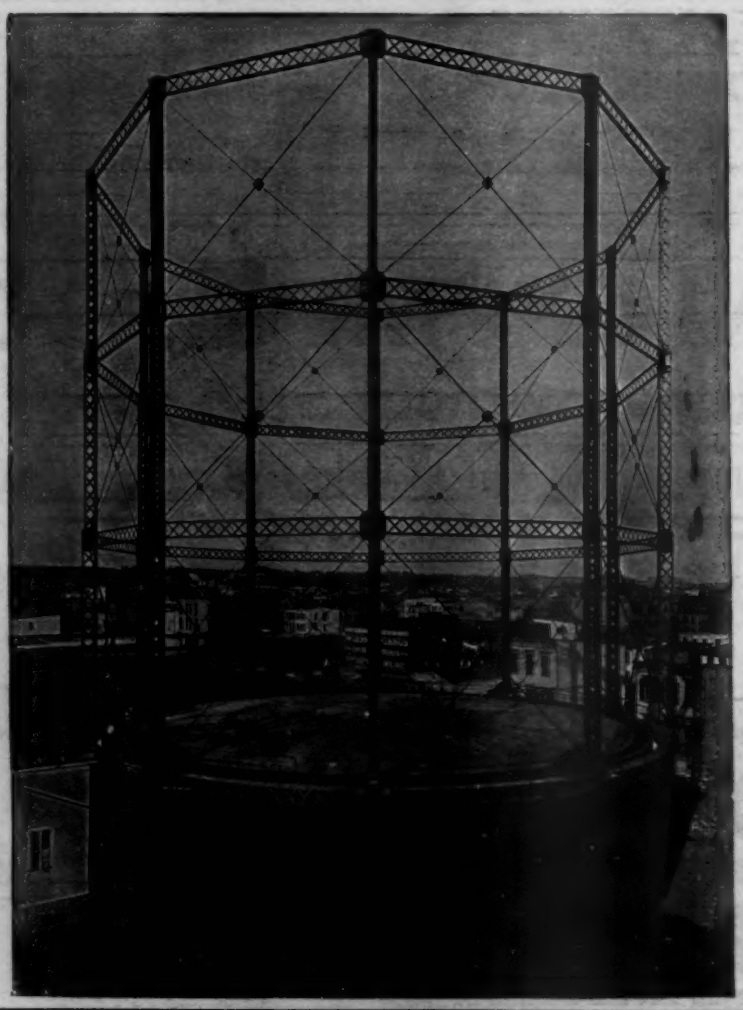

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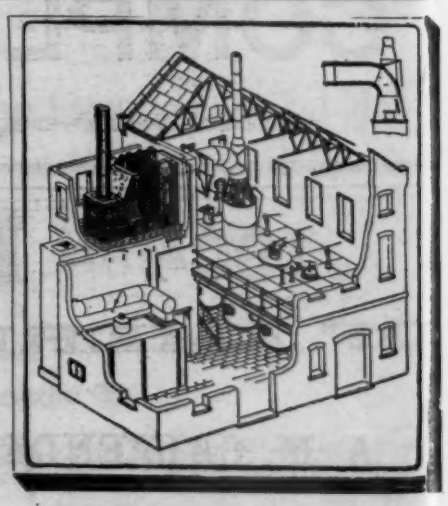

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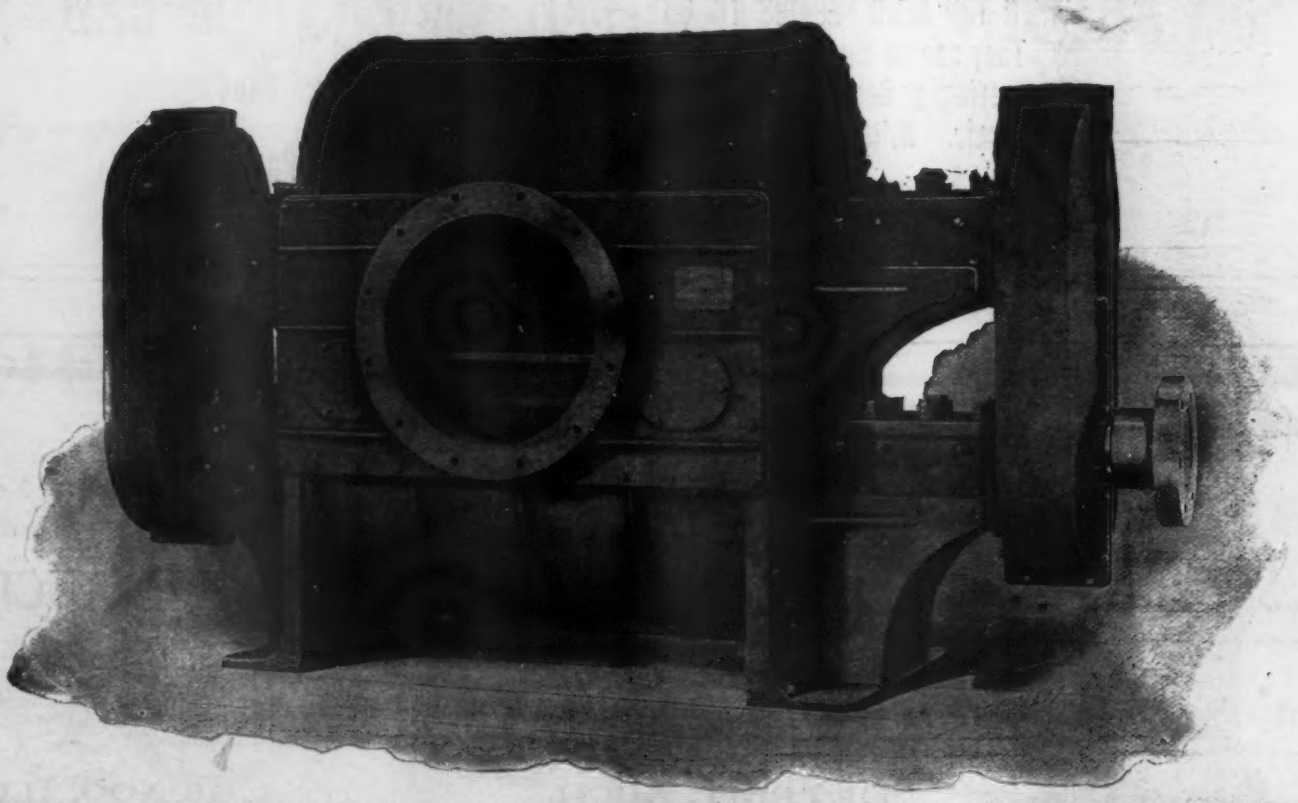

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